The Farm

QUARTERLY, WINTER, 1956, FIFTY CENTS

Hog Farm Gross $250,000

Performance Testing for Beef Cattle

The Boom in Grain Sorghums

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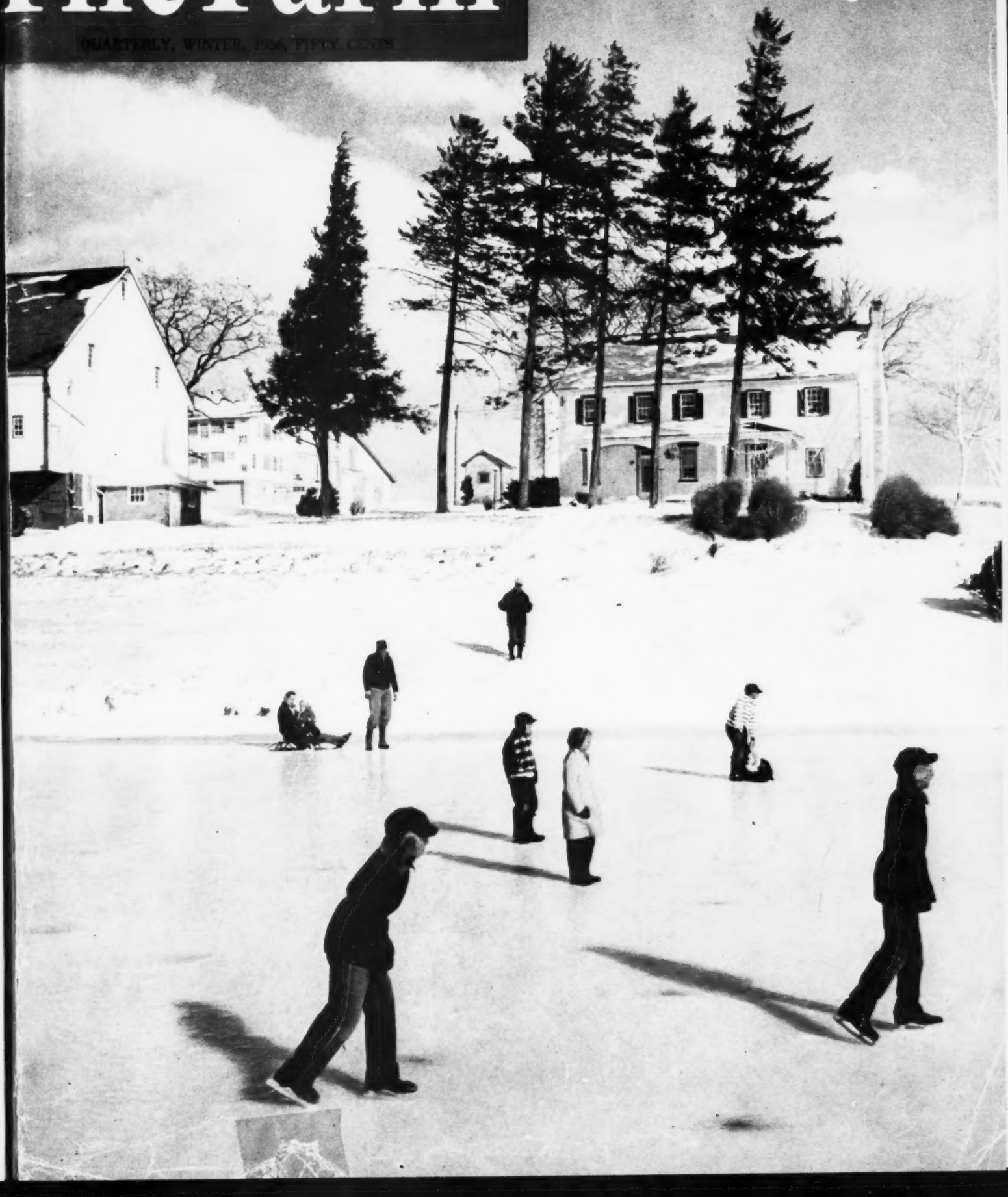

Super-Sure-Grip famous Wedge-*in* action helps you walk away with winter work!

Why Super-Sure-Grip does more work, keeps tire costs low—

EXCLUSIVE, RULER-STRAIGHT LUGS, coming closer together at shoulders (A), take a "wedge-in" bite that *firms* loose soil—gives "the greatest pull on earth!"

O-P-E-N C-E-N-T-E-R helps *ruler-straight* lugs bite deeper, pull better!

LONG, EVEN WEAR — *ruler-straight* lugs work evenly against soil, roll smoothly on road — and so wear slowly and evenly!

RE-LUGGING SAVINGS — vastly stronger body keeps Super-Sure-Grip *fit* to re-lug or retread — and *re-use.*

HAULING HEAVY LOADS UP FROST-HARD SLOPES takes every bit of grip a tire has—and then some! The "and then some" is what you get plenty of in Super-Sure-Grip! World-famous *extra* features, like ruler-straight lugs with "wedge-in" action, give you the *extra* pulling power to soften up tough jobs – to save gas, time and toil on *every* job. That's why survey after survey shows that, regardless of price—

MORE FARMERS PREFER GOODYEAR TRACTOR TIRES THAN ALL OTHER MAKES *PUT TOGETHER!*

Look for this sign; there's a Goodyear dealer near you.

GOODYEAR TIRES

Goodyear, Farm Tire Dept., Akron 16, Ohio.

GOODYEAR

Super-Sure-Grip Tractor Tires

Super-Sure-Grip—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

NOW-up to *20% MORE PUSH* and *PULL* power
NEW INTERNATIONAL 300 Utility tractor

PLUS FARM-EASY FEATURES FOUND IN NO OTHER UTILITY TRACTOR!

NEW **FAST-HITCH** for Back . . . HITCH! . . . and Go implement hook-up . . . fast job switch.

NEW **HYDRA-TOUCH** for "live" *2-way* hydraulic implement control —most useful system ever built!

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P.O. Box 7333, Dept. FQ-12, Chicago 80, Illinois
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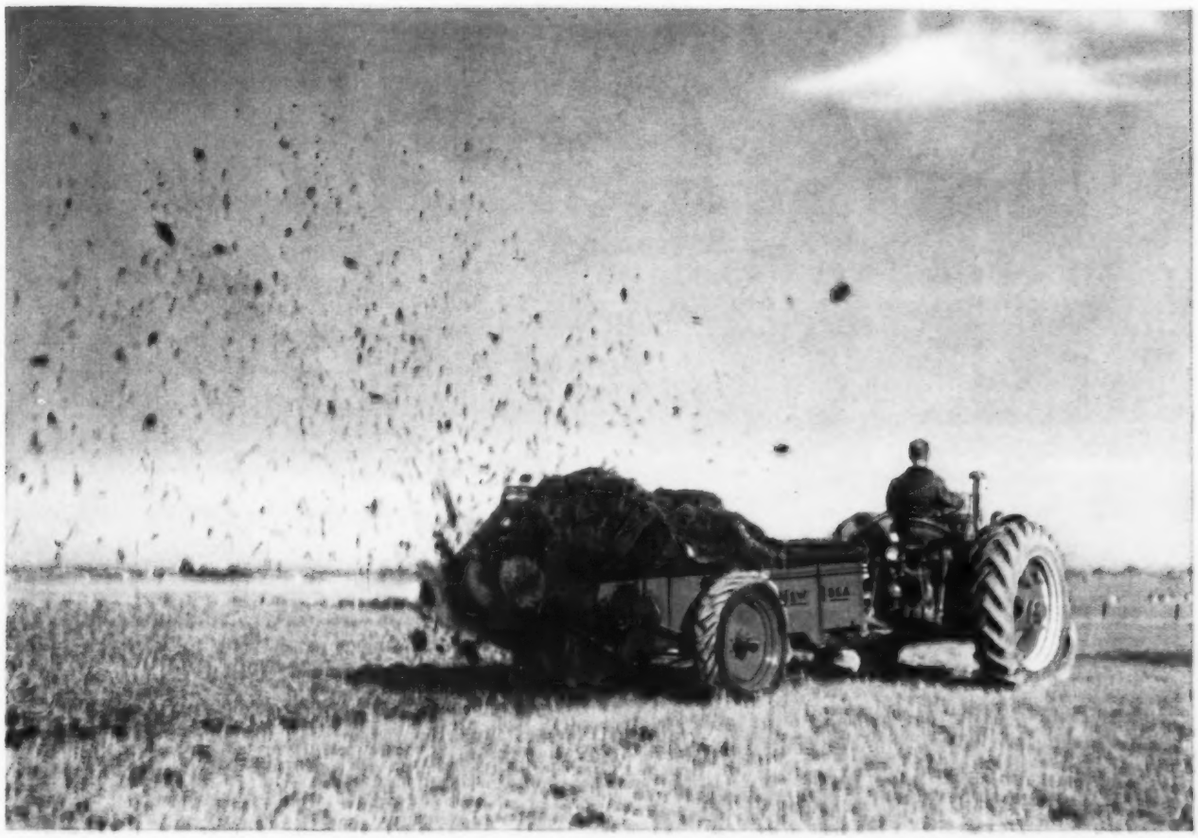

New Idea 95 bu. No. 17—biggest and brawniest of all ground-driven spreaders

How to turn pride into profits

It sets a man up to own possessions that are admittedly the finest of their kind. Such as the sleek new hardtop in his driveway. Or the NEW IDEA Spreader so easily identifiable across his fields.

More for your money

But pride of possession has a purpose, too. The farmer who operates a NEW IDEA Spreader does so with the certainty that it will return him more on his investment at trade-in time than any other spreader he could buy.

No Johnny-come-lately owns such a reputation. NEW IDEA built the first "widespread" manure spreader two generations ago. It has sold more spreaders to more farmers for more years than any other maker . . . changing, improving, perfecting year after year.

Stronger than need be

Today's No. 17 NEW IDEA Spreader is the finest in 56 years. It is engineered stronger than need be to take more punishment than you'll ever give it, even under the shocks of modern mechanical loading.

Its big pine box is Penta-treated against rotting. Its full-length steel flares provide extra protection. Its oversize tires give better flotation. Its slanted rear arch prevents plugging and leaves extra swing room for the loader bucket.

Pays for itself

It pays to operate a machine that loads quickly, shreds finely, spreads wide and evenly, maneuvers handily. It's wise to own a machine so rugged it will perform like new, years after it has paid for itself in service.

And trade-in time brings final proof of your foresight in selecting NEW IDEA: top prices at farm sales, top allowances on new models.

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In addition to the No. 17, your community NEW IDEA dealer has three other manure spreaders in a line powered and sized for every farm operation. See him for first-hand information. Or write us for detailed, illustrated literature. The facts, we are sure, will convince you that a NEW IDEA is good for your pride . . . and your profits, too.

NEW IDEA Farm Equipment Co., Division of AVCO Distributing Corp., Dept. 1650, Coldwater, Ohio

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...with its Vast Research Facilities Produces These Better Products for Your Better Living

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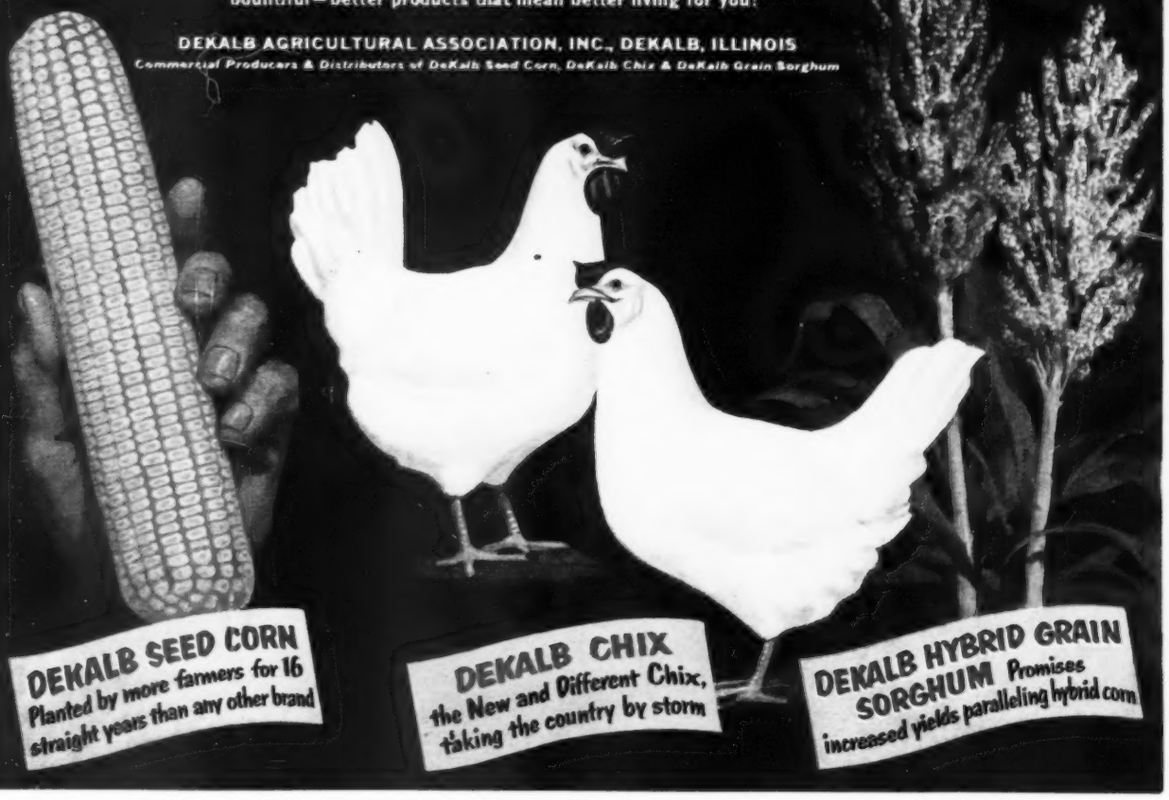
Commercial Producers & Distributors of DeKalb Seed Corn, DeKalb Chix & DeKalb Grain Sorghum



DEKALB SEED CORN Planted by more farmers for 16 straight years than any other brand

DEKALB CHIX the New and Different Chix, taking the country by storm

DEKALB HYBRID GRAIN SORGHUM Promises increased yields paralleling hybrid corn

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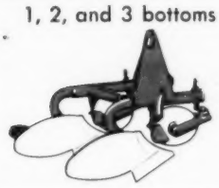
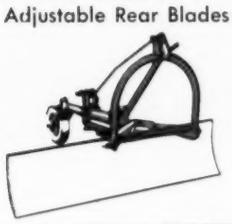
Over 70 quick-attached mounted implements... and 11 Ford Tractor models

Moldboard Plows 1, 2, and 3 bottoms 	Disc Plows	Subsoiler	Tandem Disc Harrows	Bush and Bog Harrow
Planters	Rear Attached Mowers	Mounted Side Delivery Rake	Rotary Cutter	Field Cultivator
Adjustable Rear Blades 	Reversible Scoop	Crane	Cordwood Saw	...and MANY MORE

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The Farm QUARTERLY

Winter, 1956, Volume 10, No. 4

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THE FARM QUARTERLY
22 East Twelfth Street, Cincinnati 10, Ohio

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Spring issue on sale March 7 at all Class A newsstands.

"With Eaton 2-Speed Axles

OUR TRUCKS DO MORE

IN LESS TIME AT LESS COST"

...says U. S. Alderman, 4,000-acre farmer of Dayton, Oregon

"EATON 2-SPEEDS ASSURE US GREATER PROFIT from our 700-acre potato field," says Mr. Alderman.

KEEPS MOVING HERE—"With the Eaton 2-Speed Axle's low-gear range," says Mr. Alderman, "our Ford trucks move along in the fields at a steady pace while workers load. Extra pulling power keeps the wheels rolling in soft ground."

SAVES TIME HERE—"On the road, Eaton's high-range gears provide the speed it takes to save time," Mr. Alderman continues. "And we make legal speeds at lower engine r.p.m.—so engine wear is reduced."

"On our 4,000 acres we grow potatoes, strawberries, pole beans, bush beans, sweet corn, grain, hay and fruit—and we raise white-faced Herefords," Mr. Alderman says. "Our hauling work is cut out for us. But we get it done, thanks to our sturdy Ford trucks equipped with Eaton 2-Speed Axles! We drive our trucks right into the fields for loading. Even when hauling heavy loads of potatoes out of soft, freshly dug fields, the Eaton's low-range gears provide the pulling power to get us through every time—no bogging down. And we move the trucks along smoothly at loading speed without time-consuming stops and starts.

"When we hit the highways, those Eaton high-range gears enable us to make legal speeds easily. From ten years' experience with Eaton 2-Speeds, we know they help us save gasoline and valuable working time. And they cut down maintenance costs, too. We're really sold on them."

"THE EATON AXLE DOES A REMARKABLE JOB for farmers who want a powerful low-speed truck for off-the-road hauling and an economical high-speed truck for the highway," says Gilbert Tilbury of Gilbert Tilbury Company, Ford Dealers, McMinnville, Oregon. Ninety per cent of the farm trucks we sell are equipped with Eaton 2-Speed Axles." *(Ask your truck dealer for a demonstration.)*

EATON

EATON MANUFACTURING COMPANY, CLEVELAND, OHIO

2-SPEED TRUCK AXLES

MORE THAN 2 MILLION EATON AXLES IN TRUCKS TODAY

PROJECT ADEQUATE ROADS: America has outgrown her highways. Today's crowded roads slow down traffic and send up the cost of marketing farm products. Support the better-roads sponsors in your state.

Whatever Your Cattle Feeding Setup...

there's a

WAYNE FEED
to meet your need

More and more result-minded cattle feeders are selecting specific feeding programs to meet their needs . . . The complete line of Wayne Cattle Feeds makes this easy and practical. For economy and efficiency, you, too, can depend on Wayne. Check your needs now!

HEAVY GRAIN FEEDING

Feed Wayne Sweet Mix. This top quality protein supplement helps produce maximum gains and high degree of finish. Ideal for show cattle, breeding herds and club calves. Extra high level of Vitamin A . . . plus special mineral balance.

GOOD QUALITY ROUGHAGE

Feed Wayne Beef Balancer. Economical blend of protein ingredients, including urea, for fattening cattle being fed good quality roughage. The protein in Wayne Beef Balancer does a good job of balancing farm grains, too.

HIGH MOLASSES

Feed Wayne Sugarine "22" Beefmaker. High molasses, medium protein . . . mineral-fortified. Feed Wayne "22" Beefmaker to cattle on full feed of grain, pasture, legume silage or anywhere a high molasses, medium protein supplement is needed.

HIGH ROUGHAGE RATIONS

Feed Wayne Roughage Supplement "A". Highly fortified. Contains unidentified factors to increase rumen bacteria activity and break down roughages for better utilization. Ideal for use with poor quality roughages. Extra Vitamin A, protein, energy sources, minerals and trace minerals. Fits into wintering rations.

FOR CALVES

Wayne Calfnip (milk replacer), Wayne Calf Starter and Wayne Calf Supplement meet every calf feeding need.

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**Easily identified by bags of bright yellow. Feed only to fattening cattle at rate of 2 lbs. per head per day.*

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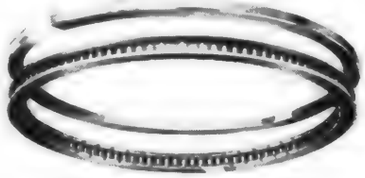
Get thousands of extra hours of
PEAK ENGINE PERFORMANCE

More time in the field! Less time in the shop! That's what you get when you install Perfect Circle 2-in-1 Chrome piston rings in the engines of your tractors, and other farm machinery.

Top performance under continuous heavy load is assured because in Perfect Circle's 2-in-1 Chrome set, both top rings and oil rings are plated with thick, solid chrome—and there's nothing like chrome for resistance to engine heat, friction and wear.

Thus—the entire area of ring travel gets complete protection, more than *doubling* the life of cylinders, pistons and rings. And there is no tedious break-in period because rings are lapped-in at the factory.

For sustained power and positive oil control install Perfect Circle 2-in-1 Chrome sets in your farm engines *this fall*. Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Toronto, Ontario.



install
PERFECT CIRCLE
2-in-1 Chrome piston rings
THE STANDARD OF COMPARISON

Where Credit Is Due

Sirs:

Your Story "Farming to Beat the Drouth" gave a good account of our operations, but I would appreciate the opportunity to say how much of an incentive my wife has been to me in my work. We have gone through some hard years together and in the thirties we very nearly lost everything as so many others did. My wife was the one who, with our children, was willing to sacrifice many things in order to hold on to the farm. We pulled thru and will pull thru this drouth, too.

Thanks so very much for your interest in our farm and our Soil Conservation District.

Clarence Svedman

Fort Collins, Colorado

Who's a Boob?

Sirs:

I found the article "Biggest Boob in the Barnyard," generally authoritative, with one exception. This exception consists of the article heading, referring to the turkey as "Biggest Boob in the Barnyard", material in the body of the article referring to the turkey as "stupid" and similar references.

Experienced turkey growers consider the turkey to be the most intelligent member of our domestic farm animals. In addition, any turkey grower will tell you that the turkey has more "personality" than any other member of the barnyard family. In fact. the turkey was held in such high regard by the founders of our Nation that Benjamin Franklin proposed the turkey should be the national bird of the United States and appear on our national emblem. Franklin believed the turkey was far more intelligent than the American Eagle, which was really "stupid", greedy and in no way typical of our American ideals and traditions. He was overruled, however, by the members of Congress who felt our national emblem should be portrayed by a fierce and warlike bird, such as the American Eagle.

Actually, the turkey has been able to survive and increase in numbers as a domestic meat producer because of its intelligence. The fact that the turkey has been able to adjust itself to the conditions of domesticity and survive and multiply is somewhat of a phenomenon. Even though hundreds and thousands of turkeys are forced to live in crowded quarters in an environment entirely foreign to them, to eat and drink under conditions where they are constantly exposed to diseases and parasites, they grow and develop in spite of all this.

The author also neglected to mention that the turkey is the most efficient producer of meat in the barnyard. The turkey can produce a pound of meat in less time and on a smaller quantity of feed than any other of our meat-producing animals.

Another fact not mentioned is that turkey meat carries a higher concentration of protein and less fat than any of our meats, and for this reason, has a great future in a diet-conscious world.

One interesting point is that Easter has become the third largest turkey-eating time, exceeded only by Thanksgiving and Christmas. No one seems to know why ham and lamb are considered by some to be traditional for Easter

PNEUMONIA! SHIPPING FEVER! FOOT ROT!

Here's the one and only

ONE-SHOT

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Dibenzylethylenediamine Dipenicillin G and Procaine Penicillin G in Aqueous Suspension

- Provides fast action . . . immediate high penicillin blood levels . . . plus prolonged action lasting up to 6 days!

In serious, acute infections such as pneumonia, shipping fever, navel ill and foot rot, immediate blood levels of penicillin in the animal followed by long-lasting levels, are desirable. Injection Bicillin Fortified gives both in a single injection. This eliminates the need for repeated injections. This one-injection treatment saves you time, effort and money.

Supplied:

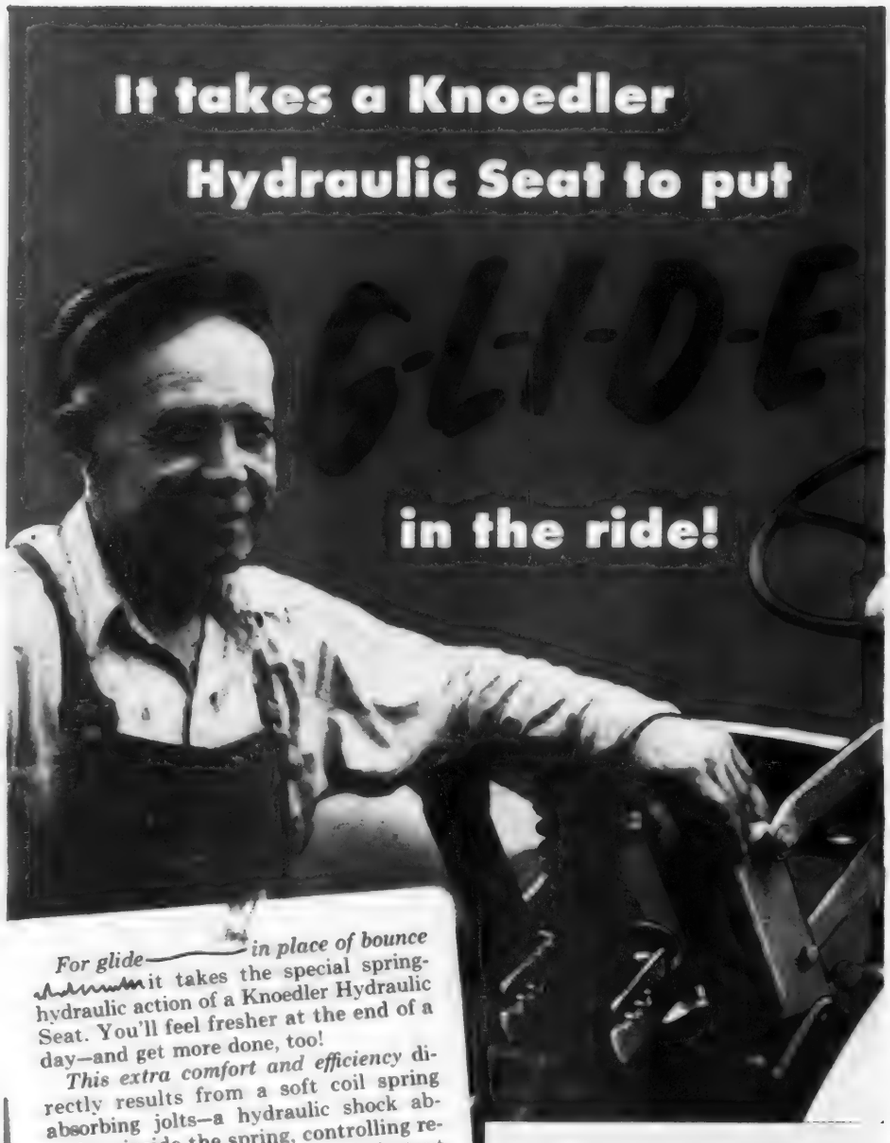
Injection Bicillin Fortified 300
10 cc. and 50 cc. vials containing 150,000 units Bicillin and 150,000 units procaine penicillin G per cc.

Injection Bicillin Fortified 600
Boxes of 10 Tubex® sterile-needle units, each cartridge containing 300,000 units Bicillin and 300,000 units procaine penicillin G.

Injection Bicillin Fortified
2,400,000 units single-dose disposable syringe.

Wyeth®
Philadelphia, Pa.

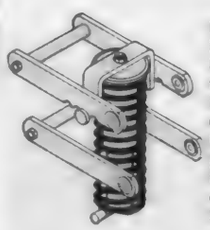
AVAILABLE FROM YOUR DRUGGIST OR OTHER ANIMAL HEALTH PRODUCTS SUPPLIER



For glide——in place of bounce it takes the special spring-hydraulic action of a Knoedler Hydraulic Seat. You'll feel fresher at the end of a day—and get more done, too!

This extra comfort and efficiency directly results from a soft coil spring absorbing jolts—a hydraulic shock absorber, inside the spring, controlling rebound. Selective notches provide instant weight adjustment. Parallel arm action keeps seat always level as it glides up and down.

Shown above is the new Knoedler No. 4800 Hydraulic Seat for Ford tractors. Over 30 other Knoedler designs fit more than 100 different makes and models of tractors and self-propelled implements. For your present machine or a new one, *insist* on a Knoedler Hydraulic Seat!



EXCLUSIVE "HEART" OF A KNOEDLER HYDRAULIC SEAT: Knoedler's great exclusive is this spring-hydraulic assembly engineered as a single unit, with both spring and hydraulic shock absorber adjusted by simple notch setting. Protected by U. S. Patents No. 2432554 and 2531572.

MAIL THIS COUPON FOR INFORMATION

KNOEDLER MANUFACTURERS, INC.
Dept. 76
Streator, Illinois

Send facts on a Knoedler Hydraulic Seat for the following:

MAKE_____ MODEL_____

I am a farmer ☐ ... dealer ☐ ... manufacturer ☐

Name_____

Address or R.F.D._____

Town_____ State_____

PUTTING G-L-I-D-E IN THE RIDE FOR AGRICULTURE AND INDUSTRY

Knoedler

MANUFACTURERS OF STEARNS-KNOEDLER POWER EQUIPMENT

There is no organized promotion behind either ham or lamb for Easter. This seems to have "just happened".

Turkey people decided that turkey had just as much reason to be "traditional" for Easter as any other meat. In just a few years, their organized promotion has resulted (to date) in turkey claiming 40 to 60 percent of the special meat sales for Easter.

M. C. Small
Executive Secretary-Treasurer
National Turkey Federation
Mount Morris, Illinois

Magnanimous Good Will

Sirs:

We all members of the 4-H Club have just now the exultant and jubilant idea in this regard that you have been pleased to send us a splendid publication, THE FARM QUARTERLY containing a lot of news of agricultural managements and programmes, miscellaneous extraordinary large and precise machineries for the farming and other all matters which we following the plough have a great interest in.

I am grateful for your magnanimous goodwill through one member of my society. and I express my heartfelt gratitude on behalf of all members.

I have at a glance had a ample knowledge that how your agricultural industries is on a large scale and plan a plantation by using various mechanized instruments.

On the other hand, we peasants of Japan are obliged to engage in the farming within the small proprietary land because of the extreme narrowness of our territory out of proportion to the increase in the population and work hard together with the whole family by the simple farming tools by reason of our being in poverty. Especially every house-keeper of farm village are in exceeding press of business what with laboring with husband on the field and having to occupy herself with family affairs in the hearth. So to emancipate them we are usually endeavoring how we should improve these evil practices in all managements.

We, therefore, feel keenly that we must lower the cost of production by managing and planning the mechanized farming on large scale as yours and make our Japanese products march on to foreign markets.

Finally, I wish you may be in good health and happiness, and I present you with our poor letter of thanks in grateful appreciation of the kindness you have done us.

Noboru Sato
President, Y. Promoting Agriculture Experiment Society
Nadari, Miyagi Pref.
Japan

Heave and Ho

Sir:

Reading the request of G. C. Smith in the Autumn issue for the proper words of command for oxen brought back to memory an instance or two of years ago.

I graduated from high school at Grand Marais, Michigan. Several times in past years I have gone back there to visit staying at the home of Axel Abrahamson, our old school bus driver. After the milking was done and the separating over, Axel would step out of the milk house and shout, "Shivilecki." That may not be the correct Finnish spelling of the word, but it brought the calves running for their meal.

My wife comes from Fulton, Mississippi. She has often related the story of Condy Perry and his 8 ox team. Mr. Perry specialized in getting logs out of almost impossible places and lumbermen used him whenever they had timber in places their own equipment couldn't cope with. His only commands were "Heave" and "Ho."

So it is whatever the animals are trained to understand.

Maurice L. Hartung
East Jordan, Michigan

How Ferguson Quadramatic Control Lets You Take Full Charge of Implements

Control of implements is sure and easy with a Ferguson "35" because of the time-tried and continually improved Ferguson System.

Right at your finger tips is new Quadramatic Control that will amaze you with its close command of implements. This Ferguson "first" lets you raise and lower implements, select draft and maintain working depth, adjust the hydraulic system's speed of response and hold implements at any position you choose—all with the same compact control quadrant.

And you'll find the other members of the Ferguson 4-Way Work Control team contributing their part to your mastery over every farm job: Variable-Drive PTO for versatile, synchronized power; "2-Stage" Clutching for one-pedal control of both transmission and PTO, and Dual-Range Transmission to insure peak efficiency in each speed range.

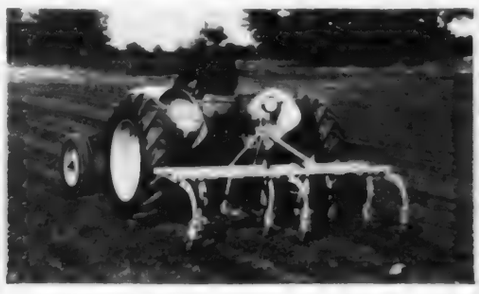
No longer need your tractor's limitations dictate how well you farm. Ask your Ferguson Dealer to show you how the Ferguson "35" lets you take *complete* charge!

Ferguson

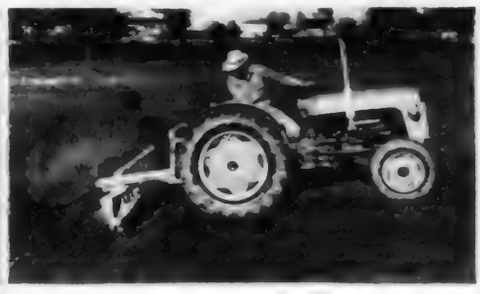
Racine, Wisconsin

FOR PLOWING, draft is maintained automatically, even with heavy overhanging implements.

FOR DISCING AND CULTIVATING, you can control penetration exactly, even in changing soils.

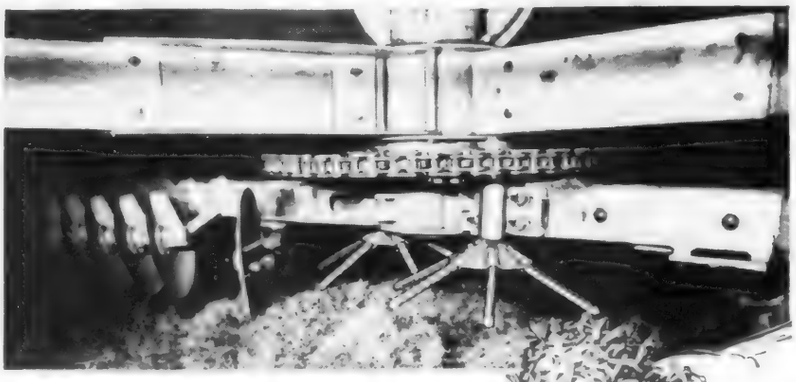


FOR UTILITY JOBS, you can raise, lower, hold, and operate implements while you're working.



New Jamesway Twin-Turbo

Silo Unloader

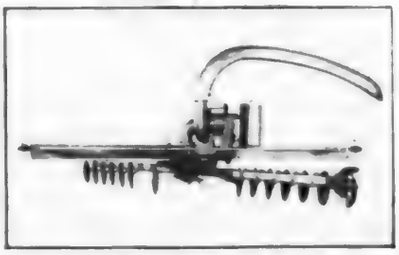


53% more efficient

YOUR first feeding shows you why no unloading job is too tough for this new Jamesway Twin-Turbo unit. It skims off the silage, smoothly and evenly. Breaks up hard chunks in freezing weather. Mixes frozen and unfrozen portions. Aerates and fluffs the mixture — makes it more palatable so cattle eat more — produce more. The reason:

NEW Twin-Turbo agitators rotate 45% faster. Give a turbine-like action that swirls, fluffs and aerates silage completely.

Whatever type silage you put up, all these benefits are yours with the new Jamesway unloader. You save time and labor. Eliminate a daily heart-straining job. Profit from improved silage texture.



LEVEL-CUT, TWIN-BOOM prevents tipping — speeds action. 3-point suspension keeps silage level . . . trims silage to within ¼" of walls.

Pay for your Jamesway Twin-Turbo Silo Unloader as you use it

As little as $231 down $31 per month

Your Jamesway dealer is the man to see for all your modern chore-saving needs

Modernize with the complete line of Jamesway Power Choring Equipment

Power Ventilation

Shuttle Stroke Barn Cleaner

Shuttle Stroke Cattle Feeder

Magic Flow Poultry Feeder

Jamesway

REG. U.S. PAT. OFF.

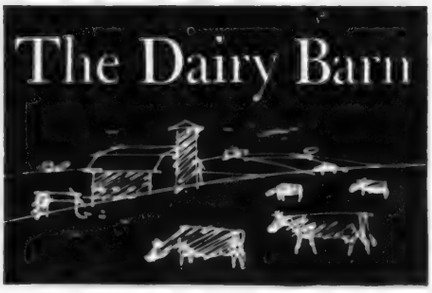
Ft. Atkinson, Wis. • Mount Joy, Pa. • Los Angeles 63, Calif.

Mail this coupon for Free Silo Unloader literature and information on other Power Choring equipment as checked: Barn Cleaner ☐, Cattle Feeder ☐, Poultry Feeder ☐, Power Ventilation ☐. Address: JAMES MFG. CO., Dept. FO-1255, c/o your nearest branch office.

Name ..... Route .....

Town ..... State .....

My herd totals about ..... cows.



MOOving Days in Bavaria When Resi (that's Bavarian for Bossy) goes into winter residence in Bavaria's Koenigssee area, you'd think she had won all the ribbons at the County Fair.

Each year, when dairy herds return from summer grazing on rugged mountain slopes, triumphant homecomings are staged in the lakeside village of Koenigssee.

As spectators watch, the animals are decorated with ribbons, pine branches and tinsel. Colorful crowns, symbolizing good fortune, are fastened to their heads and then they parade through the village.

The cow which has given the dairy maid the least trouble during the summer becomes the festival queen. Usually extremely docile, she receives an ornate crown three feet high and her body is bedecked with ribbons.

Fanfare meets the return of the herd

only if all the animals have avoided mishap while grazing near the 8,000-foot-high Watzmann, Germany's second highest mountain. If harm has befallen a member of the owner's family during the summer, portions of the elaborate gear are not used.

During the past year, five herds, each belonging to a different family, crossed Lake Koenigssee in June and returned in October. A Festival of the Cows (Almabtrieb) honored each of the herds; however, the crowns were eliminated from the fourth herd because of death in the owner's family.

Old-timers say the festivals originated in the Middle Ages when farmers first began ferrying their herds to summer pastures. The family of Matthias Banholzer, owner of the fifth herd, has been ferrying cattle to the highlands since 1486.

Careful handling is required to protect the herds from the 750-foot-deep lake and 4,500-foot-high grazing slopes.

(*Continued on page* 136)

now's the time to buy a new

1956 Massey-Harris Combine

under the exclusive M-H Ownership Plan

Exclusive Massey-Harris
OWNERSHIP PLAN
gives you 5 good reasons for
ordering your 1956 Combine now
instead of waiting until Spring

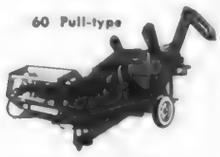
- ★ **guaranteed price as of signing date**
- ★ **5% interest on down payment — cash or trade-in**
- ★ **crop failure deferment clause**
- ★ **guaranteed delivery**
- ★ **no preseason carrying charges**

Applies to all Massey-Harris Combines — Pull-type and Self-Propelled — regardless of size.

Under the exclusive Massey-Harris Ownership Plan you are protected against price increase, even in the face of constantly rising material and manufacturing costs. You have no delivery problems . . . no grain loss when your crop says "go". In addition, you get 5% interest on your down payment — cash or trade-in.

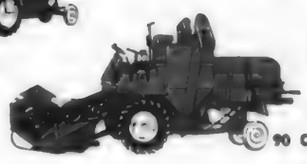
And when you own a Massey-Harris you have a combine that knows how to get clean grain . . . and more of it. Moreover, you have the confidence that goes with the recognized leader in combine development, manufacture and uses.

Guarantee your combine for the 1956 harvest. Massey-Harris, Quality Ave., Racine, Wisconsin.



Keep your eye on

Massey-Harris



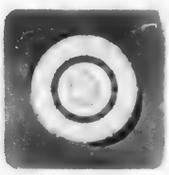
See your dealer now!

When Tractor Hydraulic System has a VICKERS® Balanced VANE TYPE PUMP

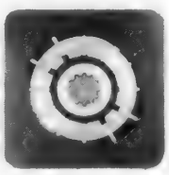
Under the very best conditions, cold weather puts a strain on starting equipment. Every part of the engine is stiffer, and the cold seriously decreases the power of the starting battery. If the hydraulic system has a pump with fixed teeth or lobes, this starting load may be seriously increased above normal

Vickers Balanced Vane Type Pumps *start at practically no load.* At rest and at normal starting speeds, the sliding vanes are retracted . . . only after the engine fires do the vanes extend and pumping begins. As a result, cold weather starting is much easier when a Vickers Vane Type Pump is used.

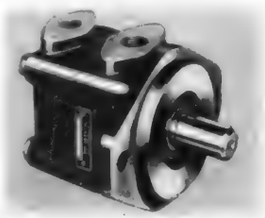
Make sure the hydraulic pump on your next tractor is a Vickers Vane Type Pump.



Schematic diagram of Vickers Balanced Vane Type Pump showing how sliding vanes are retracted at normal engine cranking speeds. No oil is pumped and there is practically no starting load.



Similar diagram of Vickers pump showing how pump vanes are extended when engine is running. Pumping then begins and continues at all engine speeds.



Vickers Balanced Vane Type Pumps for mobile equipment are available in several basic sizes and delivery ratings suitable for all farm tractor applications

6610

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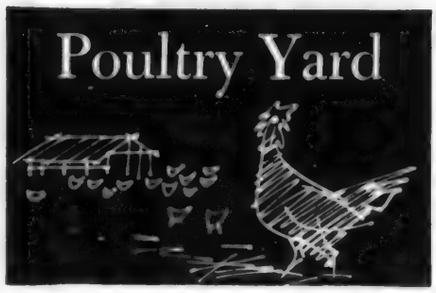
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

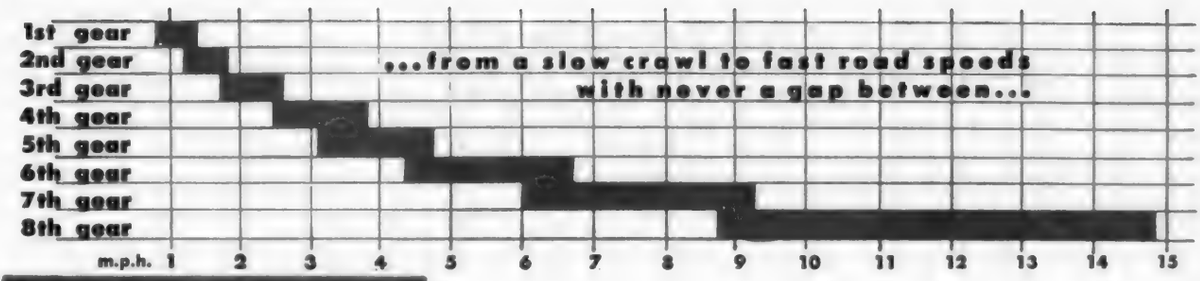


The Feed of Yesteryear Whenever someone mentions the fine rate of gain and feed efficiency we have achieved, an argument is bound to start as to whether the major share of the credit should be given to the newer feeds or to the breeding that has gone into today's chicken. The tests run recently at the University of Maryland do not solve this problem, but they do show that feeds have been vastly improved. Chickens of the same breeding were tested on rations which were recommended in 1930, 1938, 1946 and 1954. At the end of eight weeks the 1930 ration produced birds averaging 1.62 pounds: the 1938 ration was next lowest with an average of 1.89 pound birds; broilers on the 1946 ration weighed 2.17 pounds: and those on the 1954 ration weighed 2.81 pounds at the end of the test. In a second test which was designed to test for the most efficient feed regardless of feed cost, 20 cross-bred cockerels gained 3.01 pounds in 7½ weeks on 1.60 pounds of feed for each pound of gain. This feed would be too expensive to start using commercially at the present time, but it shows where we are heading and what can be done.

Feather Merchants Feather pickers in the hen flock may be getting a preview of the chicken feed of tomorrow. In laboratories and experiment stations across the country, scientists are trying to convert this high-nitrogen by-product of the processing plant into a protein supplement. They have found that cooking the feathers for an hour under pressure, then drying them and grinding them into a meal produces a high protein feed. Though high in protein—the quality of the feather meal protein is not high since it lacks several of the essential amino acids. Research at the American Meat Institute Foundation has shown that up to 2½ per cent feather meal may be fed, provided it is balanced by an equal amount of blood meal or meat and bone meal. The rest of the protein may be made up of soybean meal.

Antibiotics At a conference of U. S. and foreign scientists sponsored by the National Research Council, the value of antibiotics in poultry feeding was a major topic for discussion. It was brought out that antibiotics feeding brings about sexual maturity at a slightly earlier age, and that hatchability of eggs, and survival

(*Continued on page* 137)


1st gear
2nd gear
3rd gear
4th gear
5th gear
6th gear
7th gear
8th gear
...from a slow crawl to fast road speeds
with never a gap between...
m.p.h. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

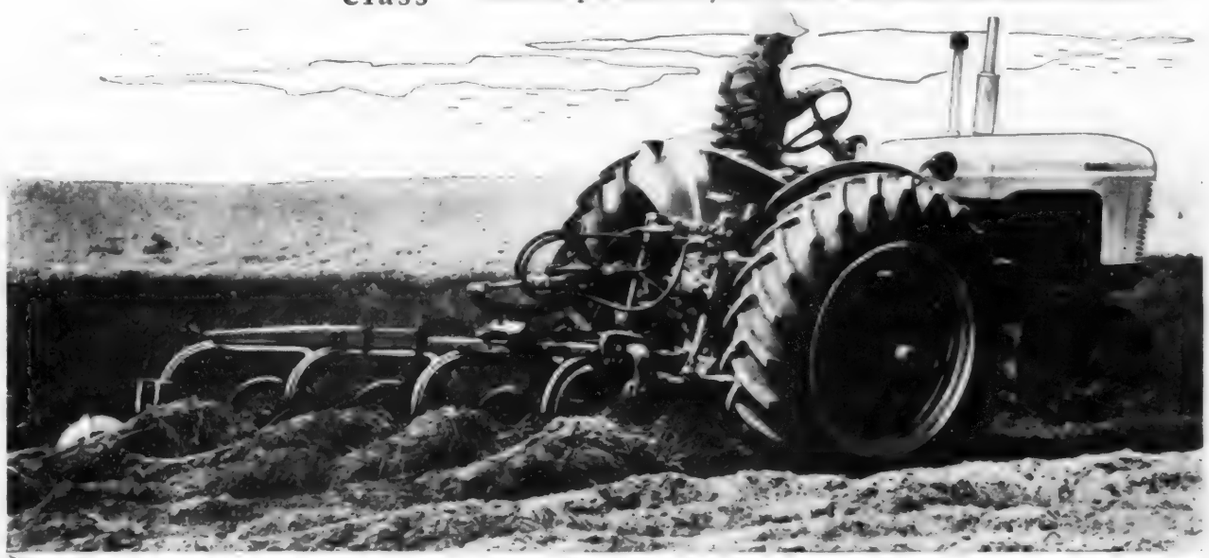
CASE "400"

Today's Finest Tractor in the 50 h. p. class

Powr-Range Transmission

Until you've tried the new Powr-Range Transmission in the 4-plow Case "400" Tractor, you're depriving yourself of a truly great thrill. With only one shifting lever and one foot clutch, you shift quickly and easily into any of eight forward gears including two smooth, steady creepers or two reverse . . . all arranged in an amazingly simple, natural shift pattern. You also have an unbroken span of speeds, shown in the chart above, that perfectly matches most favorable speed range of the engine. If conditions slow the engine down to maximum torque, you always have another gear in which to pull the load at the same ground speed in which you were working . . . or even faster.

The Powr-Range Transmission is just one of the many features that have brought recognition to the Case "400" as America's finest tractor in the 50-horsepower class. There's the new Powrcel Diesel engine that starts directly on diesel fuel at the touch of a button . . . new Powrdyne engine for gasoline, LP-gas or distillate . . . Duo-Control hydraulic system for instant implement control . . . positive, short-turn steering with Uni-Thrust suspension. See your Case dealer about this dream to drive.



Find out all about the sensible Case Income Payment Plan that lets you buy the Case "400" or other machinery when you need it, pay when you have money coming in. Check below or write in margin for catalogs you want. Send to J. I. Case Co., Dept. M-905, Racine, Wis.

☐ 4-Plow Case "400" Tractor ☐ Eagle Hitch Mounted Plows
☐ 5-Plow Case "500" Diesel ☐ Case Income Payment Plan

Acres you farm_____ Student?_____

Name_____

Address_____

_____

When the weather says
"NO"
a CAT*
Diesel Tractor says—
"YES"

Floyd Chappell, Worley, Idaho, keeps his D4 and 'Dozer busy all winter long clearing snow.

In wet seasons Bickham Bros., Tillar, Ark., use their D4 to build terraces.

■ The season is at hand where your farm labor efficiency often drops 'way down, and you call it quits for most of your costly farm equipment. *Not so* for farmers and ranchers who own Caterpillar track-type Tractors, as proven by the photographs above! The sure-starting diesel operates in any temperature, while ground-gripping tracks take a big load through muddy or snow-bound feed lots, fields or roads. With a Cat track-type Tractor you can keep busy on profit projects the year 'round.

The Cat Diesel runs for a few cents per hour—fuel costs are 60% to 80% less than gasoline wheel-type tractors. Result: you keep your farm hands employed and busy 12 months per year earning and saving you money. Have your Caterpillar Dealer give you all the details—he will, gladly.

Write for your free copy of "Soil and Water Conservation"; it shows you how conservation will give you more profit today and more savings tomorrow. Address Dept. FQ1255.

CATERPILLAR TRACTOR CO., PEORIA, ILL., U.S.A.

CATERPILLAR*

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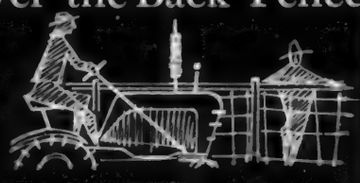
Over the Back Fence



The British Have A Word For It British farm workers, most of whom belong to a labor union, the National Union of Agricultural Workers, recently submitted a claim for an increase in the weekly wage. Based on a 47-hour week, the minimum was raised from £6 ($16.80) to £6 7s ($17.78) only last January. The workers now want £7. ($19.60).

Bicycles and Parity Along the first part of last month I was sitting around the Circleville store listening to what was going on and I overheard a stranger complaining about price supports for farmers, and as best I could make out what he was saying, he was opposed to 'em, on the grounds farmers ought to compete with world prices by getting more efficient, which is the usual argument, and I didn't pay any attention to it, as I was listening more to a neighbor who was telling me he'd made twice as much corn this year as he did last year but his net was only two dollars an acre more, on account of the lowered, or as we say around here, Bensonized prices.

He also said he'd made a lot more corn this year than last year and it was a good thing, because it took about two bushels this year to buy as much tractor gas as one bought last year.

I came on home and was wandering around out here on my farm enjoying a touch of Fall weather and not making any plans particularly for the coming winter as I haven't gotten around to some of the plans I made year before last, when I found a newspaper caught on a mesquite bush. I always marvel at how smart nature is, putting thorns on mesquite to catch papers, and I gratefully took it off and picked out a comfortable spot in the warm afternoon sun and looked it over.

I hadn't gotten far when I ran into an article that made me sorry I hadn't seen it before that stranger left the store.

According to it, Congress has passed and the President has signed a new law raising the tariff on imported bicycles. As the article explained it, the bicycle manufacturers in this country had gotten Congress to pass the law because so many foreign-made bicycles were coming into this country they were destroying the market and endangering the life of the American bicycle makers. By putting on a higher tariff, our bicycle makers will be able to

(*Continued on page* 136)

Mail Coupon Below

FOR Bigger AND Better Crops

Soil Can Make —Or Break You!

Without the right fertilizer in the soil, even the best farming cannot prevent stunted, deformed corn ears and weak stalks that lodge. Leading Agricultural Experiment Stations made these tests to show the benefit of using the right fertilizer.

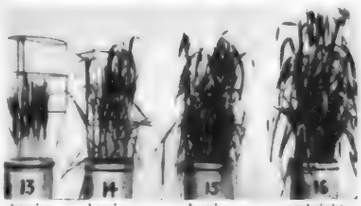
Both joints and roots had rotted in the weak stalk and nubbin from a field not properly fed, shown by cutting down the center. This caused poor yield and difficult harvesting. It also robbed the soil of fertility a bumper crop would have returned.

The tremendous root system, sound stalk and perfect ear above was from a comparison plot where correct kinds and amounts of fertilizer were used.

Astounding Proof!

The right fertilizer, guided by soil tests, produced the bumper corn in bin at right.

It's also the secret of vigorous, healthy oats as demonstrated in pot 16. The wrong fertilizer formula will cut your profits on every crop.



low in nitrogen | low in phosphate | low in potash | used right fertilizer

These benefits on corn and oats are just as true for every crop on your farm. Don't miss the bigger yields you can have by owning a Sudbury Soil Test Kit!

OUR DARING Guarantee

YOU TAKE NO RISK

We are so certain you'll get bigger and better crops we'll refund the full purchase price anytime within a year if you don't.

If desired, use our Easy Payment Plan (see coupon).

TEST YOUR SOIL

Want to Get up to 227 Bu. Corn per Acre
125 Bu. Wheat • 5 Tons Hay • 30 Tons Tomatoes
906 Bu. Potatoes • Up to 300% Increase in Milk

Make every $1 you spend for fertilizer pay you up to $15 or more, in extra yield. A farmer in Ohio boosted production on corn 300%, oats 500%, wheat 100%, hay 300% with his Sudbury Soil Test Kit. So can you!

You not only make more money, you save money! Every season you'll save up to $15 an acre on fertilizer. Guessing wastes both time and money—like the farmer in Illinois who "guessed" he needed to spend $500 for lime but soil tests showed he didn't. That $500 paid for all the phosphate he found was really needed on 65 acres.

Make More Money in 1956!

You can get your farm income back up to or above your best year by growing more bushels or tons per acre. All over the country hundreds of thousands of farmers are doing this by soil testing. You'll produce record yields, and actually build up your soil for years to come instead of draining its vitality. That's like putting extra tax-free money in the bank!

The Under Secretary of Agriculture says "To meet the cost-price squeeze, farmers must get higher yields per acre and greater production per animal. That means spending wisely to maintain and expand production." Crop experts say the average yield of American farms can be doubled. ***In just two weeks your Sudbury Soil Test Kit will pay for itself many times over!***

No Knowledge of Chemistry Needed
EASY AS READING A THERMOMETER

So simple anyone can use it. Even your first tests will be accurate and reliable. No waiting for reports—you get the correct answer right away. Ready to use anytime, anywhere. Takes only 10 minutes, costs less than 10c a test.

SUDBURY Soil Test Kit

This is our famous **Farmers deLuxe Kit.** Complete with everything you need for hundreds of tests. More valuable than all your stock and tools! Shows right amounts of nitrogen, phosphate and potash for each field. Also whether lime is needed (pH) and how much. Lifetime welded steel chest with carrying handle—stands rugged field work. Weighs only 12½ lbs. Easy-to-follow instructions show needs of 225 different crops.

Big Value, only $29.95

SEND NO MONEY

Order today and we'll mail C.O.D. plus postage. Or send check and we'll pay postage, saving you from $1.91 to $3.55 in postal charges.

FREE TRIAL

FREE BOOK

If you send cash, we'll also include the farm management book "Our Land and Its Care."

SUDBURY LABORATORY
Box 262, South Sudbury, Mass.

Send me the Farmers deLuxe Sudbury Soil Test Kit at the special low price marked below:

☐ Enclosed is $29.95; send postpaid; include free book, "Our Land and Its Care."

☐ Send C.O.D. only $29.95 plus postage.

Name .....

R.D. or St. .....

P.O. ..... *Zone* ..... *State* .....

☐ Send on Easy-Payment Plan—I'll pay mailman $4.95 plus postage, then 4 monthly payments of $6.75 each.

400,000 Users Can't Be Wrong!

S.G.H. of Michigan "guessed" his potato field had enough potash but needed nitrogen. Tests showed he was wrong. He saved the nitrogen, bought potash and doubled his yield.

G.H. of Ohio "Have made many tests; like its simplicity and accuracy. Worth 1000 times its cost on my 320 acres; found them low in phosphate."

A.D. of Indiana nearly doubled his corn yields as a result of testing his soil. He also gets 30% more wheat and soybeans per acre.

W.L.D. of Pennsylvania saved $400 an acre on fertilizer. "The Kit has paid for itself over and over again." That's real satisfaction!

R.S.G. of Indiana tested his soil and discovered potash was badly needed. He has increased his corn yield 20%! He also reduced fertilizer costs by using only what his Sudbury Soil Tests showed was needed.

A.F.B. of Iowa increased his bean yield 50% by correcting phosphate and potash deficiencies his Sudbury Soil Test Kit revealed.

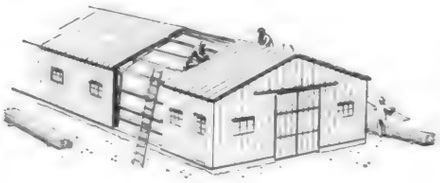
Hardware, Seed, Grain and Farm Supply Stores: Serve Your Customers by Carrying this Essential Aid to Better Farming.

SUDBURY LABORATORY, Box 262, South Sudbury, Mass.

World's largest makers of Soil Test Kits

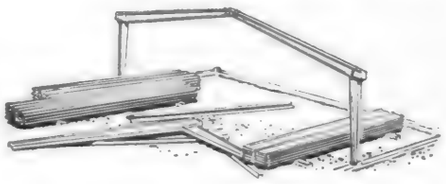
You can do all this with a Butler metal building

Complete it in ½ the time—Half-finished at factory. Precision die-formed and punched cover panels. Goes up fast by simply bolting together.



Expand it economically while in use—Move out walls and fasten in new sections with less than half the usual delay and mess—and without loss of materials.

Move it quickly and conveniently—Yes . . . move it, with 100% material salvage! Simply remove fasteners, transport sections to new site, and re-assemble.



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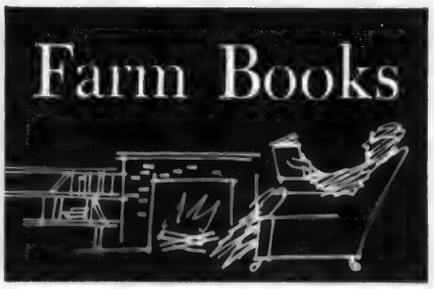

Getting Started in Farming, *by S. E. Johnson, Milo J. Peterson and others. D. Van Nostrand Co., New Jersey, $5.25.*

Every good publication, whether it is a magazine, newspaper, or a book, has a specific audience in mind. *Getting Started in Farming* is written for the young man who is still in school, but is thinking forward and trying to plan his life—the FFA boy. The two principle authors and the four others who have collaborated with them are all specialists in their field and speak with authority when they advise on farm management matters. Though the book is aimed at raising the questions that must be answered and sharpening the awareness of the young man about to become a farmer, it can also be read with profit as a beginner's book in farm management.

The Meat Hog, *by Claude H. Hinman. Published by the author, Ft. Collins, Colorado, $4.75.*

In the long discussion of meat-type hog vs. lard-type, Claude Hinman now has the last, and by far the pleasantest word to say. Because he cannot resist telling a story or a joke, this book is extremely readable. Because of years of experience as an extension specialist, hog raiser, and livestock judge, Hinman writes with a breadth of knowledge which makes this book well worth reading. The subject is one that is of great importance to the swine industry; without attacking anyone, Hinman points the way to improvement in every breed.

Sprinkler Irrigation, *by A. W. McCulloch & J. F. Schrunk, Sprinkler Irrigation Association, Washington, D. C., $6.50.*

The need for a good, thorough book on sprinkler irrigation has been long felt and loudly demanded by farmers who were investing thousands of dollars in irrigation systems. The compilers and editors of this book (they prefer to call themselves that rather than the authors) have done a good

(*Continued on page* 140)

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., OF THE FARM QUARTERLY

Published quarterly at Cincinnati, Ohio for October 1, 1955. Required by the Act of Congress, August 24, 1912, March 3, 1933, and July 2, 1946. Publisher—F & W Publishing Corporation, Cincinnati, Ohio. Editor—R. J. McGinnis, Cincinnati, Ohio. Managing Editor—Grant C. Cannon, Cincinnati, Ohio. Business Manager—Aron M. Mathieu, Cincinnati, Ohio. Owner—F & W Publishing Corporation, Wilbert Rosenthal, James Rosenthal, Aron M. Mathieu, all of 22 E. 12th St., Cincinnati, Ohio. There are no bond holders, mortgages, or other security holders. Sworn to and subscribed before me this 28th day of September, 1955.

(Signed) Aron M. Mathieu, Business Manager
(Signed) Clifford Laemmle
My commission expires October 5, 1957.

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GEORGE TURNER, Lowell, Ind., finds B. F. Goodrich Power-Grip tires make quick work of harvesting oats. The cleats are square cut at the shoulders to defy slippage.

RESEARCH KEEPS
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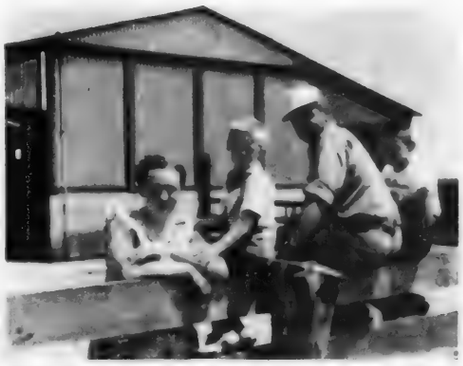
says MAURICE FULLER, Chalmers, Indiana



Here is Mr. Fuller, his wife, Maxine, and children, Roger and Richard. Mr. Fuller owns 225 acres of land.

One side of building is used for cattle, other side for hogs. Plastic roof panels admit light during day.

Hogs are fed and watered automatically, and a truck-mounted auger fills the bins.

Here's a second steel building on Mr. Fuller's farm. He uses it for general machinery storage.

Overall view of the 60 x 107 steel building. Notice the headroom, sufficient to admit trailer truck. Center is used for feed and hay storage.

MR. FULLER'S FARM, in historic Tippecanoe County, Indiana, supports between 425 and 800 hogs (depending on season) and 42 head of cattle for market. The hogs, cattle and soy beans are his income producers.

Mr. Fuller says, "With other types of buildings, a fire could destroy the whole farmstead. But even if the contents burn in my steel buildings, the fire won't spread.

"I couldn't hope to run a farm like this myself without the latest equipment. The steel buildings are a big help because the maintenance costs are so low."

They've had some bad storms and tornadoes near the Fuller farm —hailstones as big as eggs. One of the twisters passed directly over a close-by steel building and all it did was roll 4 roof sheets up a little. Repair cost was only $25. The same twister completely destroyed dozens of other type buildings, but all the steel buildings are still standing.

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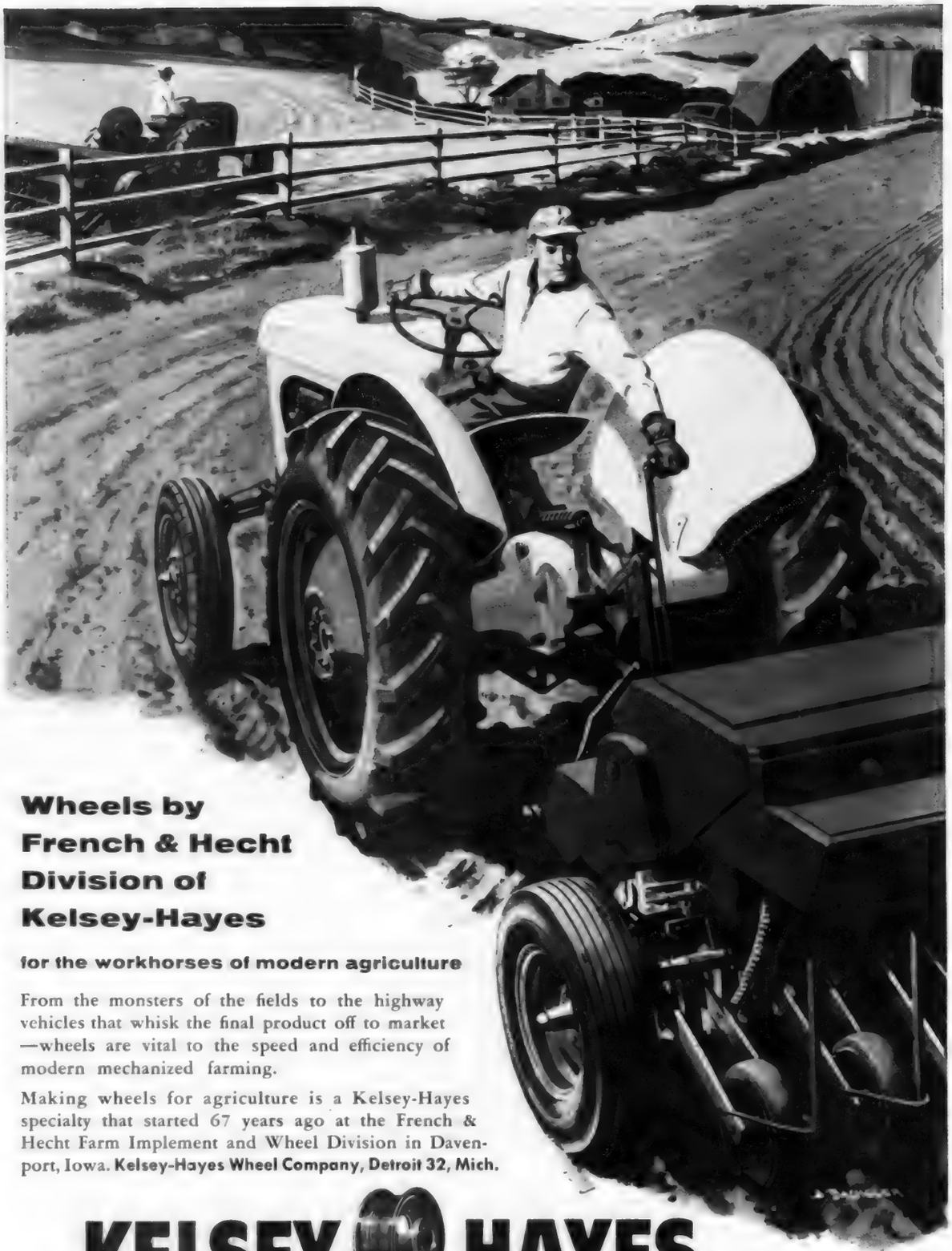

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performance testing

Swing of the Pendulum

By Charles R. Koch

LAST YEAR (Autumn, 1954) THE FARM QUARTERLY published an article based on the thesis that for cattle the show ring is failing to justify its continued existence. It is not promoting the production of the kind of cattle which are efficient and profitable beef. The article was essentially negative in its approach. While it offered a few suggestions for improvement it was concerned chiefly with an appraisal of the futility of raising watch-charm cattle and fitting them so highly as to handicap them seriously as breeding stock.

The past fifteen months have seen an increased interest in measuring and selecting cattle on their weight gaining ability. Ranchers and farmers are advertising performance tested stock; feeders and buyers of replacement cattle are so eager to secure cattle from such herds they are paying premiums for them. Shocking as this may seem to some, we feel it is not a revolution involving a reckless disregard for the principles that have given us our superior stock. It is the swing of the pendulum.

Such a swing occurred 80 years ago in the cattle world. In his "History of Shorthorn Cattle" the late Alvin H. Sanders, highly respected agricultural journalist, put his finger on a situation almost perfectly analagous to the present position of the cattle industry. After describing the low estate to which the breed had fallen because of extreme emphasis upon type and pedigree, he concluded:

"There is nothing so dangerous as popularity. Whenever it is demonstrated that cattle of any particular line of breeding possess pronounced merit and represent a blood concentration likely to insure prepotency, a widespread demand leads to the retention for breeding purposes of 'all sorts and conditions' of cattle carrying the coveted pedigree. The really good specimens are taken by leading breeders or wealthy speculators at fancy prices, leaving the inferior and indifferent 'misfits' for those whose purse does not permit of the purchase of the best. Thus it came to pass that during the years of inflated values the tendency of Shorthorn breeding was away from correct standards, so far as practical excellence for the farm, the dairy, or feed-lot was concerned."

Then Mr. Sanders outlined the events which worked for the eventual salvation of the breed:

"Several causes conspired to bring American breeders to their senses about this period. Coincident with the declining merit for practical purposes of those tribes that were most frequently in the public eye came the invasion of the markets of the West by two of Britain's most distinguished beef types; to-wit: the Herefords and black polls. The establishment of the American Fat-Stock Show at Chicago, which occurred in 1878, gave these new candidates for public favor an opportunity of which they were not slow to take advantage. 'White-faces' and 'doddies' began to appear in force for the first time in the history of American cattle-breeding at the great State fairs of the West. Enterprising and intelligent men devoted time and ample capital to a presentation of their merits as feeders' and butchers' beasts. It was apparent from the beginning that before the tribunal of practical men constituting the great body of Western feeders and stockyards buyers only such Shorthorns as possessed substance, feeding capacity and natural wealth of flesh could successfully defend the colors of the 'red, white and roan.' Style without stamina could not resist the shock. Finish without flesh failed to satisfy the cold logic of the block. Those who had been dictating terms to the Shorthorn cattle breeding fraternity were now confronted with a competition that based its claims not upon past reputation, but upon actual present worth. Something weightier than mere pedigree, something more tangible than mere pride of birth was the crying need."

Following are two articles about methods of cattle breeding which base their claims "upon actual present worth." The one, a conservative approach, outlines the present position of performance testing and introduces the new American Beef Cattle Performance Registry Association which has been set up to standardize testing practices throughout the nation. The other is a story of the methods of Tom Lasater, one of the most radical men in the business.

Do either, or a combination, of these methods point the way to better beef production? We're not sure. But no one in the beef business can afford to ignore them.

"The Scale is Mightier than the Eye"

say farmers and ranchers who are improving their herds with weight-for-age tests

"LIFE IS JUST TOO SHORT for any man to use a bull that won't gain four hundred pounds on a one hundred and forty day feeding test." That is the opinion of J. P. Smith, Manager of the PanTech Farms, out on the high plains of the Texas Panhandle, where 543 young bulls have been fed on test during the past five years. It is a typical Texas declaration, one that needs a bit of qualifying about what kind of ration the cattle are fed and how they are handled. Purebred and commercial breeders from coast to coast, however, generally agree: Bulls which cannot gain more rapidly than the average of a group on competitive test have no right to a place in the herd.

Performance testing of beef cattle, an idea that started out in a small way at a few of the experiment stations some years back, has caught on and has snowballed into an avalanche which is bowling over a lot of the unscientific and outmoded concepts of selection and breeding, and replacing them with new standards. "The scale is mightier than the eye," is the battle-cry of the movement.

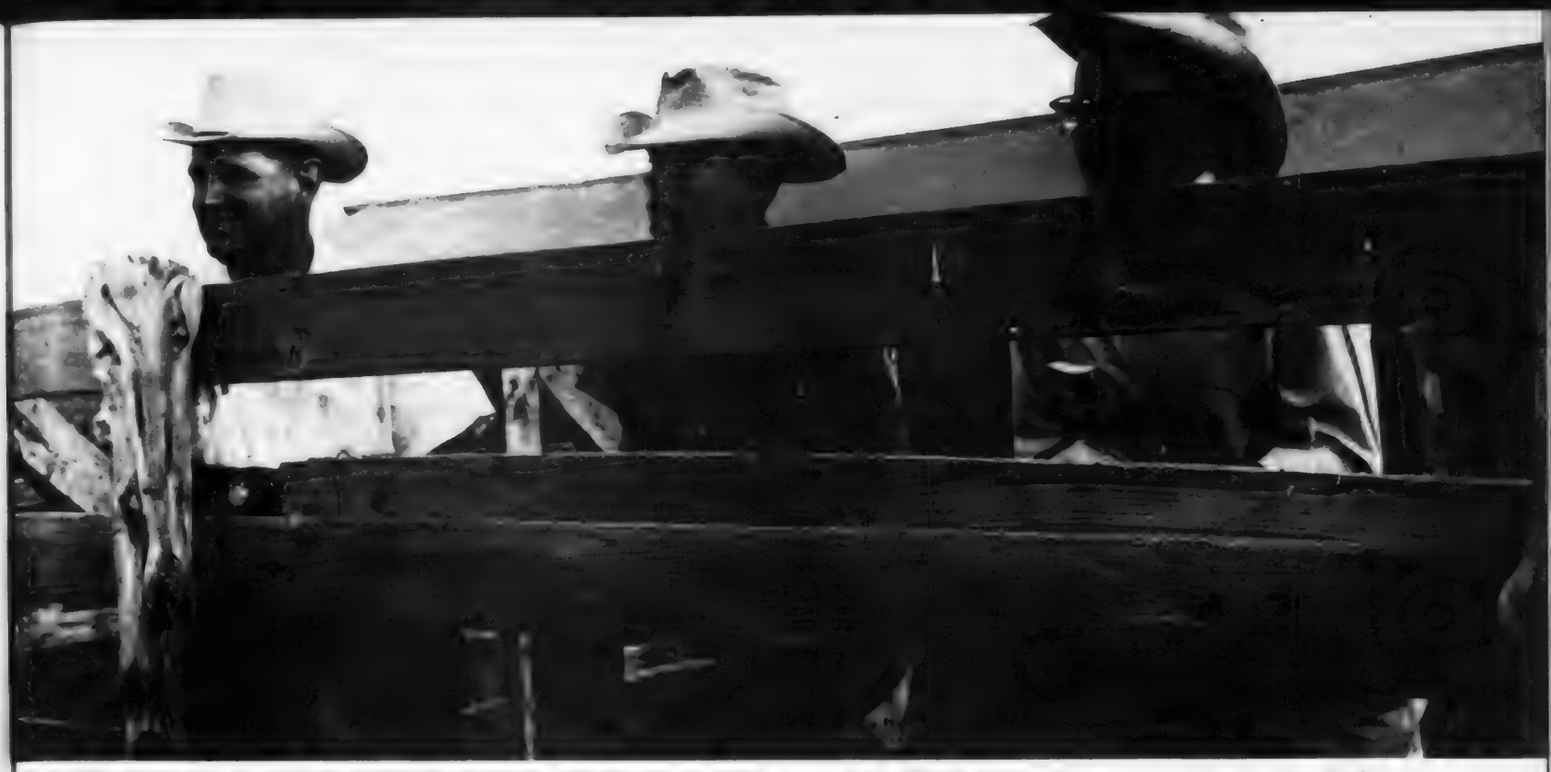
Performance testing actually is simple. It is based on the principle that the prime object of the cattle business is to produce beef. The western rancher, the farmer in the hill country of Indiana or Tennessee, the purebred breeder in the bluegrass region of Kentucky, the producer on the rich new Coastal Bermuda and Dallisgrass lands of Georgia and Florida, have that one aim—to harvest the maximum possible poundage of beef off their cows every year and to sell it at the best possible price. Likewise, the feeder wants useful cattle that will convert his grains into meat as rapidly and efficiently as possible. And the consumer—let's not leave him out—expects good meat at a reasonable price.

Beauty and eye appeal, say the proponents of performance testing, do queer things to a man—as if that were anything new. No attorney wants a blonde on the witness stand unless she is on his side. Nevertheless, over the years, breeders and feeders have been so entranced by the beauty of what they considered good cattle that they completely forgot to ask themselves what connection these characteristics have with the efficient production of beef: they restricted their selection almost entirely to visual standards, which in many instances have become extremely artificial.

Every calf on the C. H. Codding and Sons Ranch is given an ear tattoo and tag at birth. The tag makes it easy for the cowboys to tell which calves have been marked and the tattoo affords a permanent identification for recording the gain of each calf.

Livestock men have always observed that some individuals grow faster than others. They puzzled over the phenomenon, but did little about it until some experimenters—demonstrators some would call them—began to work with the sons and daughters of these faster gaining individuals to see if they would emulate their sires and dams. The answer was a definite yes. Today no one will argue with the fact that rate of gain on feed is 65 per cent heritable.

That was the start of progeny testing. Feeding tests are made of groups of calves sired by various bulls. The results are compared and the individuals whose get turn in the best records of gain are retained as herd sires. But this is a long and expensive process. A much faster method and one which is just as reliable is record of performance testing. The young, prospective herd sires are themselves fed on test. The poor doers are



To standardize practices for weight-for-age tests on the farm and ranch, a group of west Texas breeders have organized the American Beef Cattle Performance Registry Association. President of the new organization is Colby Conkwright (right), farmer and rancher of Hereford, Texas, shown here sizing up some of his 1955 calves with his son Jim (center) and J. P. Smith, manager of PanTech Farms.

eliminated and the better ones go back into the herd.

Efficiency of Gain

Admittedly, there is no check here for efficiency of gain. Most stations and most individual breeders who are running performance tests keep no record on the amount of feed consumed by the tested animals. But at those stations where records have been kept on feed consumption it has definitely been established that the fastest gainers are also the most efficient. For example, the high gaining bull at the University of Kentucky last year put on an average of 3.10 pounds a day for 150 days on feed. He needed 637 pounds of feed to make 100 pounds of beef. The low bull gained an average of only 1.83 pounds a day, but he consumed 744 pounds of feed to make a 100-pound gain. This is just one example, of course, but these figures from six years of Montana trials show that it is typical:

Year	Feed per cwt. of gain	
	High Bull	Low Bull
1946-47	638.4 lb.	923.4 lb.
1947-48	665.2	685.4
1948-49	785.1	1,116.2
1948-50	568.3	746.2
1950-51	647.6	742.2
1951-52	550.8	1,173.5

With this kind of information any breeder is justified in assuming that in a similar environment rapid gaining cattle are also the efficient kind and he can save himself the added labor and expense of recording the feed that goes into his animals on test.

By far the greatest part of performance testing, up to now, has been conducted at the experiment stations or as cooperative projects set up at some central point. It has been largely a matter of demonstrations. As Dr. W. P. Garrigus, Chairman of the Animal Industry Group at the University of Kentucky admits, "We have only been priming the pump to encourage breeders to do more private testing on their own farms." If the great mass of cattlemen are to benefit from this work it will have to be carried out on their own farms and ranches.

But this isn't difficult. All it takes is a set of scales, a notebook, a tattoo or some other device to mark the cattle for identification, plus the courage to cull as the records dictate. In some areas a man doesn't even need to have his own scale. Out in the Texas Panhandle, which has a concentration of some of the most performance-conscious ranchers in the nation, the Amarillo Chamber of Commerce has purchased a mobile scale for the use of the County Agent's office. This scale can be towed behind a car like a trailer and is whizzed along the road from one ranch to the next in charge of a supervisor who makes an official record of the cattle weights.

The principal figures that need recording are date of birth, weaning weight, weight at the date of entry on feeding test and weight at the conclusion of the test, usually a 140 to 150 day period.

Testing on the Home Place

The records which a man's cattle make on his own place are invaluable as a tool in selection. They are probably even more valuable than those made at a central testing station because they are made under the exact conditions in which the herd is maintained and on the rancher's individual ration. When one of his bull calves or one of his heifers under such conditions outgains the average by a half to three quarters of a pound a day he knows those are the animals to keep. He is also mighty sure that those that fall below the average are the ones to feed out and send to the yard. Of course, he can defeat the purpose of the entire test by putting his calves on nurse cows and giving this or that favorite a little help with a hormone or added supplement. Crutches of that kind must be broken across the knee if the test is to have any value.

While there can be no objection to comparing the performance of a group of bulls from Ranch A with the performance of a group from Ranch B when both groups are tested at a central station on exactly the same ration, direct compari-

(*Continued on page* 122)

A mobile scale purchased by the Amarillo Chamber of Commerce is a great help to local ranchers testing their own herds for performance.

performance testing

Tom Lasater made his own breed

THIS IS A STORY about a man who became dissatisfied with the kind of cattle he was raising and developed his own breed. The story isn't so much about the new breed as it is about the unorthodox and original system of performance testing the breeder used to build the cattle of his dreams.

The man is Tom Lasater. His 17,000 acre Colorado ranch sits astride Big Sandy Creek at Matheson, about 50 miles northeast of Colorado Springs. That puts him in the foothills of the Rockies where his cattle graze in a rarified atmosphere of some 5,500 feet. Way down at Falfurrias in the southern tip of Texas he has another ranch where the climate and altitude contrast sharply with the Colorado layout. This one he remote controls from the Colorado homestead. A dictating machine which records on a flat, easily mailable disc affords him an easy flow of directives and exchange of experiences with his Spanish-speaking Texas foreman.

In case you've never met Mr. Lasater we'll warn you to keep your guard up. Dressed in his Levis and boots, with a well-tanned face beaming out from under his Stetson, there's no mistaking the man's profession. In his mid-forties, he has the build of a sharply trained middle-weight boxer. Most of his punches are strictly verbal. He is a straight-talking, controversial figure in cattle circles with a bagful of off-beat ideas that leave the conventional cattle breeder in a state of shock. But success proves he's still far from needing a guardian.

The breed he originated is the Beefmaster—big, beefy cattle with the heavy, drooping ears of the Brahman and the Brahman hump in the males. They are the result of a cross of Brahman, Hereford and Shorthorn and come in all colors and mixtures of colors—red, black, white, yellow, brindle, roan, spotted—with red probably predominating. No effort has ever been made to select for color. Tom Lasater's father, the late Edward C. Lasater, ran 20,000 head of range cattle on his Falfurrias ranch and, in 1908, introduced Brahman bulls into his herd. He was once a pillar of the Jersey breed with his herd of 3,000 of the Channel Isle cattle. He also bred a strain of Herefords with red around the eyes. Tom's herd still shows evidence of this strain. Pigmentation around the eye, according to the Lasaters, and other experienced cattleman, is a guarantee against cancer eye and pinkeye.

His herd is still small by range country standards. He has about 630 cows and heifers of which 350 are on the Colorado ranch. Dry weather and drastic culling make expansion slow.

The conformation of the Beefmasters, particularly the cows, is hard to describe. At first glance one is tempted to say they come in all shapes and sizes. But after riding around the Lasater ranges for awhile it becomes apparent they have several definite and important characteristics. They are big-bodied, long, of extreme heart girth, and with hindquarters that would delight the eye of the most discriminating packer buyer. Because of their infinite color pattern one can never look at a cow and say with complete assurance, "There stands a Beefmaster." But one who looks at a Lasater Beefmaster will seldom hesitate to say, "There stands a beef cow."

They have good udders, too; udders which are well designed to do the job at hand. And they are the most gentle cattle that ever chewed a cud.

The bulls are huge, long-bodied critters

(*Continued on page* 86)

"Limit your goal and keep your standards simple," says Tom Lasater (top, opposite page), "if you want to make progress in beef breeding." Promoter of some of the most radical ideas ever to hit the cattle industry, Lasater blended the genes of Brahman, Hereford and Shorthorn cattle to produce his own unique breed, the Beefmaster. They come in all colors (bottom, opposite page) and under range conditions consistently wean 600-pound calves. Docility is an important point in Lasater's six-point standard. They are so gentle (above) they will walk up to a strange photographer and stick their tongues out at him.

Off-Season Irrigation

Off-season irrigation can supply all the water needed by alfalfa and wheat; it can be used to store water for corn

OUT IN NEBRASKA a small group of farmers are keeping their sprinkler systems running eight to ten months of the year. In fact, they put down more water during the wet seasons—fall, winter and spring—than they do during the dry summer.

At first thought this seems to be a very unorthodox, even impractical thing to do. Why take a drink when your belly is already full of water? But the more you think about it, the more you're apt to say, "A very, very good idea if it works."

Well, out in Nebraska it's working. Those farmers out there tried it and found it good. They reasoned, "Why not store water in our best reservoir, the soil, during the seasons when water is the most plentiful? And why not irrigate when we have time instead of during the season when we're up to our necks in work?"

During the winter, there is no plant growth and so there is no transpiration and very little evaporation of the water. The irrigating can be done when the farm work load is light and when it is easiest to irrigate, because there are no crops to interfere with pipe moving. The water stays in the root zone and, they have found, such crops as alfalfa and wheat can be irrigated for the whole year in the fall. By irrigating in the off-season when there is no rush to cover the ground, they can irrigate more land and bring water to more crops than they can possibly cover with summer irrigation alone. In this way they are stretching their irrigation system to cover more land and keeping expensive equipment working most of the year.

Off-season irrigation begins as soon as the system can be pulled off the corn and is continued as long as the ground is open. In the spring, the sprinklers are back at work as soon as the frost is out of the ground. During the past two years the farmers have been too painfully aware that their soil was bone dry; even so, the careful ones have tested for soil moisture with moisture meters or with a probe, or by digging with a shovel before they began their off-season irrigation.

Over long years of irrigation, they have learned how many inches of water each foot of their soil will hold. Most of them start with the wheat land and put on enough water to saturate the soil to a depth of five feet. When the wheat is planted, this water gets it off to a good start and there is enough left to carry it to harvest. Alfalfa land is watered to a depth of ten feet, which gives this deep-rooted crop enough moisture to produce big yields. Corn land is watered to five feet, which carries the crop through to tasseling time and takes some of the pressure off summer irrigation schedules. Always, they put on the water first and fertilize later, so that they don't leach out the plant foods.

The enthusiasm of these Nebraska farmers for off-season irrigation has been justified by truly outstanding yields during one of the worst drouths the state has endured; but there are limitations to its use over the nation. Men who have studied the practice feel that it can be a revolutionary technique for farms with deep, well drained soils in areas where winter rains and snow do not fill the water need. In shallow soils with little water holding capacity, off-season irrigation should be considered as

This pond never rests. In deepest winter, with a heavy ice cover, it forms a skating rink for the family. From the time the ice melts until it forms again, the pond is a reservoir for irrigation water that is tapped before planting, during the growing season, and late into the fall to water winter wheat and alfalfa.

an emergency tool in the spring when soil tests show that the land is still thirsty after the winter rains. On poorly drained land, off-season irrigation could be a menace—if the soil is filled to capacity and then gets a good rain, the run-off is bound to cause costly erosion.

Even in the areas where the practice is best suited, only a handful of pioneers have braved the jibes of their neighbors and irrigated in the winter. One of these men is Fred Asche.

Fred Asche Eats First Oyster

On January 12, 1955, an unusually warm day for the middle of the Nebraska winter, Fred Asche watched with quiet amusement as a pair of his Toulouse geese hissed and scolded the irrigation company's truck as it crossed the crackling, dry stalks of his lost corn crop and drove off down the farm lane. He looked at the great stacks of pipe, couplers, and sprinklers and at the new pump and powerful Diesel engine that crouched over his new irrigation well and pushed back his ancient felt hat, which had been shielding his eyes from the city men. This hat, which the years had shaped to fit his personality as well as his head, is an accurate indicator of his moods—when he meets strangers it seems to slip of its own accord down over his eyes; when he grows jovial the hat works itself back on his wind-reddened forehead at a convivial angle. Now, as he looked at his new equipment, it sat on his head very soberly.

Eleven thousand dollars worth of equipment, but it might save him another disaster year such as the one last year when his corn grew three feet tall and then wilted and died of thirst, when his wheat was hardly worth harvesting. "Clint," he called to his son in his blurred German accent, "the ground is still open let's start irrigating."

Before noon the next day, the father and son had assembled the system and were sprinkling the first water on the wheat they had dusted in the preceding September. Every day that the weather stayed above freezing during this unusually mild winter Asche kept the water falling onto his rolling Nebraska farm. When it got cold enough to coat the stubble and weeds with sparkling ice, he waited for the sun to warm the air; when the ground froze and wouldn't take the water, he shut down the system and waited for a thaw.

By corn planting time, Asche had put nine inches of water on his wheat and had gone over the 140 acres of black loam on which he planned to plant corn, pouring seven inches of water on one field and three and a half inches on the other. In June, a hail storm threshed out an estimated 18 per cent of the wheat, but, even so, he combined 48 bushels to the acre while those of his neighbors around Columbus who had not plowed under their wheat to save what little soil moisture there was, were harvesting seven or eight bushels.

All during the summer, while unirrigated corn stood stunted and burned in the fields and even willows and maple trees died for lack of water, Asche kept his system running. Every morning he and Clinton went out into the fields and moved the lateral pipe another 60 feet down the main line, one holding the lateral by the riser, the other supporting the pipe on a crutch formed by cutting out the center tine of a three-tined pitch fork. It took them an hour and a half to move the half mile of pipe, a section at a time, through the tall, wet corn and get the system running again. Then, for ten hours, the system sprinkled the field, putting down four inches of water before Asche and his son came out in the evening and moved the pipe to a new setting for the night.

All this hard work is paying off. As the summer irrigation season drew to a close, there wasn't a corn field on the farm that didn't look like at least a hundred bushel crop. And the corn on the land that got the seven inches of water before planting had maintained a steady advantage over the corn that had only three inches. As for the work, Asche said, "Irrigating isn't the toughest job on the farm. I'd rather move pipe than fork wheat into the thresher or milk a herd of cows by hand —and I've put in a lot of years doing those jobs."

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Even with skim ice sealing the surface, a pond loses water through evaporation. During the off-season, there is little water loss from the soil through evaporation or through transpiration, since plants make but little winter growth.

By M. H. Berry

Nature's Fly Trap

Mares eat oats, goats eat ivy — that's normal. But it's a man-bites-dog affair when a plant eats an animal. That's what the pitcher plant does. This lovely, innocent-looking plant is a blood-thirsty meat eater with murder in its heart. To add to its guilt it entices its victims into its maw by beautiful colors and sweet nectar — a refined come-into-my-parlor approach to life. The pitcher plant eats insects—bees, flies, anything in the meat line that comes its way. There are other carnivorous plants in the more exotic tropics, but the pitcher plant is the only one distributed generally throughout North America.

The manner in which the pitcher plant lures and destroys its victims is one of the strangest phenomena in natural history. The blossoms are very unusual and beautiful, but it is the trumpet-like leaf that does the dirty work. Usually the broad leaf blade at the top of the pitcher is decorated with purple lines, all of which extend downward into the throat of the pitcher. In the pathway to the throat there are hundreds of short stiff hairs which, like the purple lines, point downward. Below this region of hairs, just beyond the upper rim, is a smooth, slippery area, and under the rim is secreted a sweet substance, said to have properties capable of intoxicating its victims and deadening their ability to resist. The trap is thus set for the unfortunate victim. Perhaps a honey-bee, attracted by the gay-colored lines, alights on the gaudy trumpet rim. Just below the bee the purple lines guide the way to the sweet secretions. The bee reaches inside the rim and takes a sip. He likes it, and crawls further and eats his fill. Now when he is ready to go on his way with a full belly, he finds that his senses are dulled, his legs and wings fouled up by the sticky nectar, and his struggles are weak. The pathway out is complicated by formidable, stiff hairs which point downward. His maneuvers will finally take him to the slippery area and there his doom is sealed.

(*Continued on page* 130)

The collecting of insects from the pitcher plant is a favorite sport of southern youngsters. These two Alabama children are adding to their bug collection by robbing the plant of a meal. This particular plant is SARRACENIA DRUMMONDII. *Not only does the fly and the honey bee fall prey to the plant, but larger insects as well.*

In the midst of a dust-dry August, Frank Allington, Nebraska sorghum grower, inspects the head of a stalk of Martin Milo, a popular variety in his area. In periods of stress sorghum seems to grow on will power alone, will normally out-yield corn 10 to 15 bushels to the acre in semi-arid regions.

Grain Sorghums

Dry weather and the demand for a crop for diverted acres have created new opportunities for sorghums. Plant breeders are meeting the challenge with hybrids

THE RUSSIAN farmers who visited our farms last summmer were mainly indifferent about our crop varieties—they have better ones, they said. But the sorghums were new to them, and, they said, made to order for Russian soil and climate. Many American farmers are also discovering the virtues of this grain and forage crop. Until recent years sorghum has been raised as a grain crop in the semi-arid sections of the Great Plains and as a silage or forage crop practically everywhere cattle are fed. Growing under its various aliases of sorgo, milo, kafir, hegari and cane, it led a pretty stable existence. During the ten year period 1943 through 1952 it populated an average of about 7.3 million acres on which it produced annually some 135 million bushels of grain. Last year the grain sorghum acreage jumped to 10.8 million with production of 204 million bushels of grain and this year 13.2 million acres poured 266 million bushels of the feed grain into bins and elevators. Apparently, this is only the beginning, for a number of factors have been at work to bring this crop into prominence.

First, there is the weather, which millions of words of talk and type have done nothing to improve. Without ever moving from their boyhood surroundings, legions of farmers have found themselves in a strange and unfriendly climate in the past few years: a climate that knows no rain. They are looking for a drouth resistant crop and sorghum seems to fill the bill.

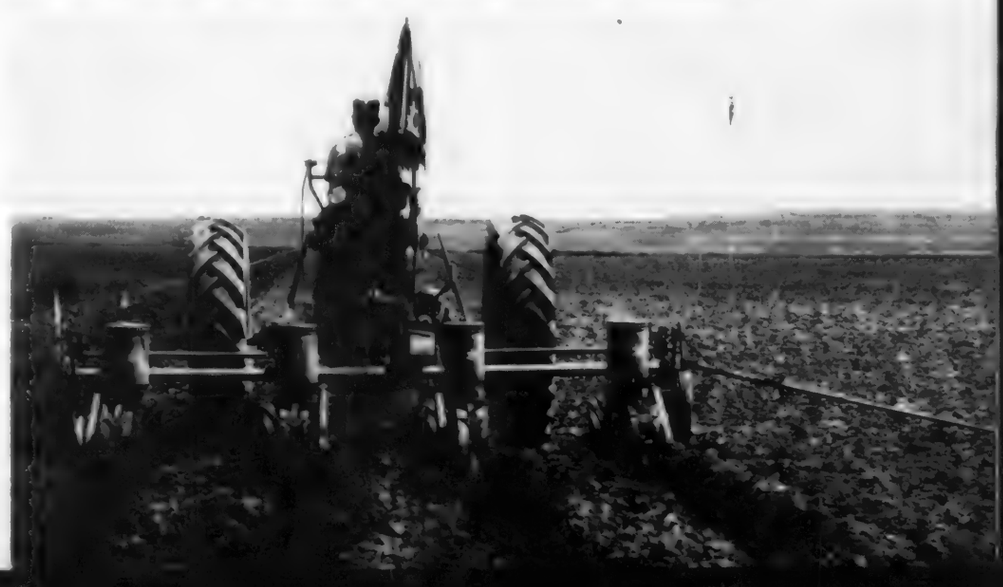
A second factor, one almost as unpredictable as the weather, is government policy. Talk about "cross compliance" a year ago started a lot of wheat and corn growers looking for some kind of crop to maintain income on diverted acres. Again, sorghum was Johnny-on-the-spot. And regardless of any future threats of "cross compliance," sorghum has proven itself a first class alternative, a crop able to stand on its own feet.

The increase in population on the west coast has brought new opportunities for profits in cattle feeding in large areas of the Great Plains formerly considered adapted only to wheat—if a feed crop can be grown there which will eliminate the expense of shipping in corn. Sorghum is demonstrating its ability to thrive in those areas and by serving as a basis for a livestock economy is helping to smooth out the rough spots inherent in a cash grain economy. It will not only outyield corn there, but makes a feed which is 90 to 100 per cent as potent as the traditional "king of the carbohydrates." It is also a good cash crop for the man who doesn't want to be bothered with livestock.

Then there are two other factors which promise to boost sorghum production even more than these—the use of driers and the introduction of hybrids. Sorghum grain cannot be stored safely at a moisture content greater than 13 per cent. This often makes it difficult to harvest in the Great Plains, almost impossible in the more humid regions. But modern, efficient driers can pull 18 per cent moisture grain down to 13 per cent at a very reasonable cost in time and money. This opens up an entirely unexplored area for the crop.

The first of the new hybrids on which plant breeders have been working for 25 years or more were introduced this fall by a commercial producer. These, and other new varieties, with their increased yields, earlier maturities and resistance to lodging and disease, are being heralded as the agents of a revolution in sorghums which will be as extreme and far reaching as that which hybrids achieved in corn.

Sorghum is planted with a lister, a grain drill, or the loose-ground furrow-opener (below). Deep planting is fatal. One of the greatest hazards the grower must face is a driving rain immediately after planting; this buries the seed too deep.



Plant breeder William Ross holds a male-sterile sorghum head in his right hand as he points to the male-fertile plant with which he is about to fertilize it in a hybridization experiment. The paper bags in his knapsack are used to cover the fertilized head to protect it from contact with wind-blown pollen.

The best way to get a line on the new kinks to which you'll have to adapt yourself to live with sorghums is to get acquainted with a man who has had plenty of experience with them. Frank Allington is one of the best. Allington is a farmer's farmer, a bespectacled, weather-beaten raiser of crops and livestock whose solid, efficient methods have enabled him to build a small Blue Springs, Nebraska, farm into a section and a half of highly productive farmland. His first try with sorghum was back in 1934 when the dry weather forced him into Atlas sorgo (sorgo is the commonly used term for forage sorghums). This turned out to be a lifesaver as silage and bundle feed. Bundle feed is the plainsman's term for forage sorghum which is cut with a binder, shocked and later fed out as a dry feed. Allington still raises Atlas for his silo, cutting the crop when the grain is in the dough stage and the leaves are green. He consistently puts up 10 tons to the acre, says he has at times gotten as high as 20 field tons, wet. In his opinion the sorgo gives a two to three times heavier yield than corn silage and has about 90 per cent the value of corn silage when the heads are good. The difficulty cattle have in digesting the whole sorghum grains seems to be the only difference in the feeding values of corn and sorghum silage.

Allington's experience with Atlas was so favorable that within a few years he began to try his hand at grain sorghums, such varieties as the old Sooner Milo and Early Kalo, plants which posed a real challenge to the farmer's ingenuity at harvest time. "Back in those days," the Nebraskan recalls, "we cut the sorghum with a corn binder, shocked it and later threshed it through a combine with the sickle bar turned vertical—a wonderful way to keep from getting dishpan hands."

The tall growing grain sorghums with their crooked heads and weak stalks were completely out of step with mechanized agriculture. As tractors and combines took over the fields, breeders soon came up with dwarf and double dwarf combine varieties 30 to 50 inches tall. This was a tremendous improvement. The crop could now be harvested with wheat equipment and was given an added advantage over corn in that harvesting was reduced to a once over operation. After the grain is combined, that's it. There is no shelling.

One of the first of the combine varieties Allington worked with was Martin and that one is still his favorite. He says he will probably swing to the new hybrids as soon as they are released; as a matter of fact, he has had hybrid experimental plots on his place the past few years. "I can't tell you anything about them," he admits, "because those boys who put them out don't identify them and are pretty mum about their records. From what I've seen, though, they look pretty good."

For all its hardiness under drouth conditions sorghum is a very tender plant in its early days. From planting to emergence and shortly thereafter is just about the most critical period of its growth. The grain sorghums are usually planted with a lister or with a grain drill in which some of the drill holes have been stopped up. Allington uses the lister. This implement plows out a furrow and the seed is dropped in the furrow not more than an inch deep. The placement must be very shallow. If planted more than an inch deep the seed will have a tough time emerging. Hard

rains immediately after planting are one of the real hazards in the sorghum business. The rain buries the seed too deep.

The most frequently recommended seeding rate is 2 to 5 pounds per acre. Some growers, and successful ones, too, are using up to 10 pounds per acre. A good rule of thumb is to plant about 1 pound for each 10 bushels of expected yield.

Being a warm weather crop, sorghum needs a warm seedbed to insure a good start in life. The soil should be about 70 degrees or else the sorghum seeds will shiver and shake and fail to germinate. The seedbed must be as weed-free as possible, too. Allington and other lister advocates point out that this is one of the advantages of planting with a lister; it also makes it easier to cultivate and control weed competition. "You have a hard time cultivating sorghum planted with a drill," he says. "The way I do it is to use a 'Go-Devil,' a two-row corn disc. On the first cultivation I throw the dirt out away from the row to cover up the weeds between the rows. On the second cultivation, after the sorghum plants have gotten up a bit, I throw the dirt into the row to get the weeds in the row. With sorghum that has been drilled, about the only thing you can do is to use a cultivator to get the weeds between the rows and then spray to get the weeds in the row."

Spraying is a practice on which the experts urge caution. The material to use is 2,4-D, but this can be injurious to the sorghum, particularly at the time of heading and pollination, and it does not faze such pests as quackgrass, crabgrass and foxtail.

If the first seeding of sorghum fails, a short season variety can often be gotten in as a catch crop. Norghum, a variety developed particularly for the short growing season of South Dakota, is one which Nebraska and Kansas farmers often fall back on. Reliance is a newer and even better short season variety.

The one virtue above all others which has endeared sorghum to Frank Allington and his fellow growers is its patience, its ability to wait out a drouth. A man could drive along the flat,

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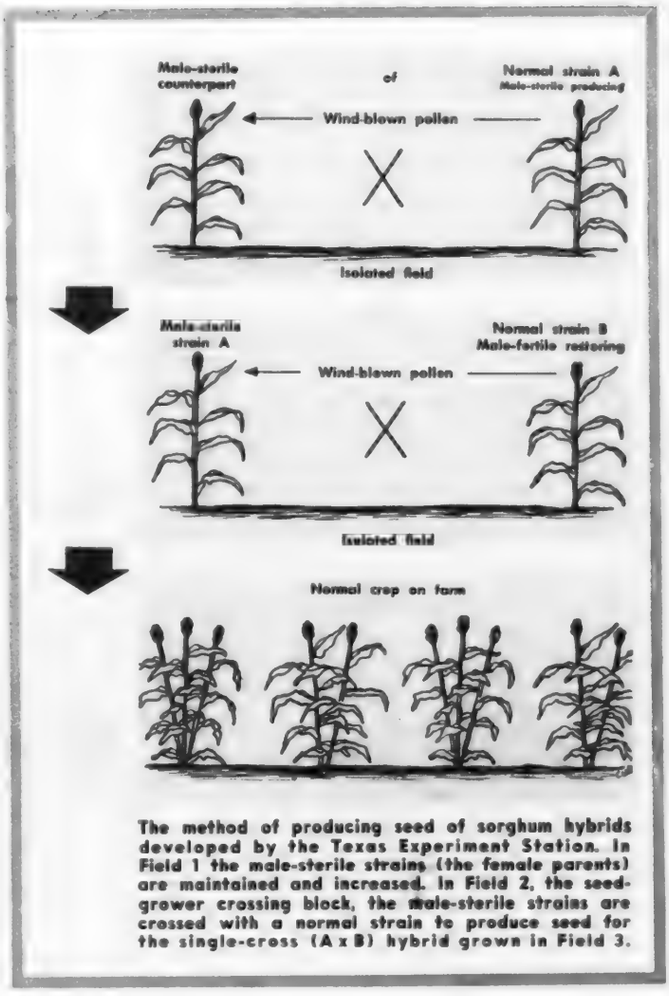
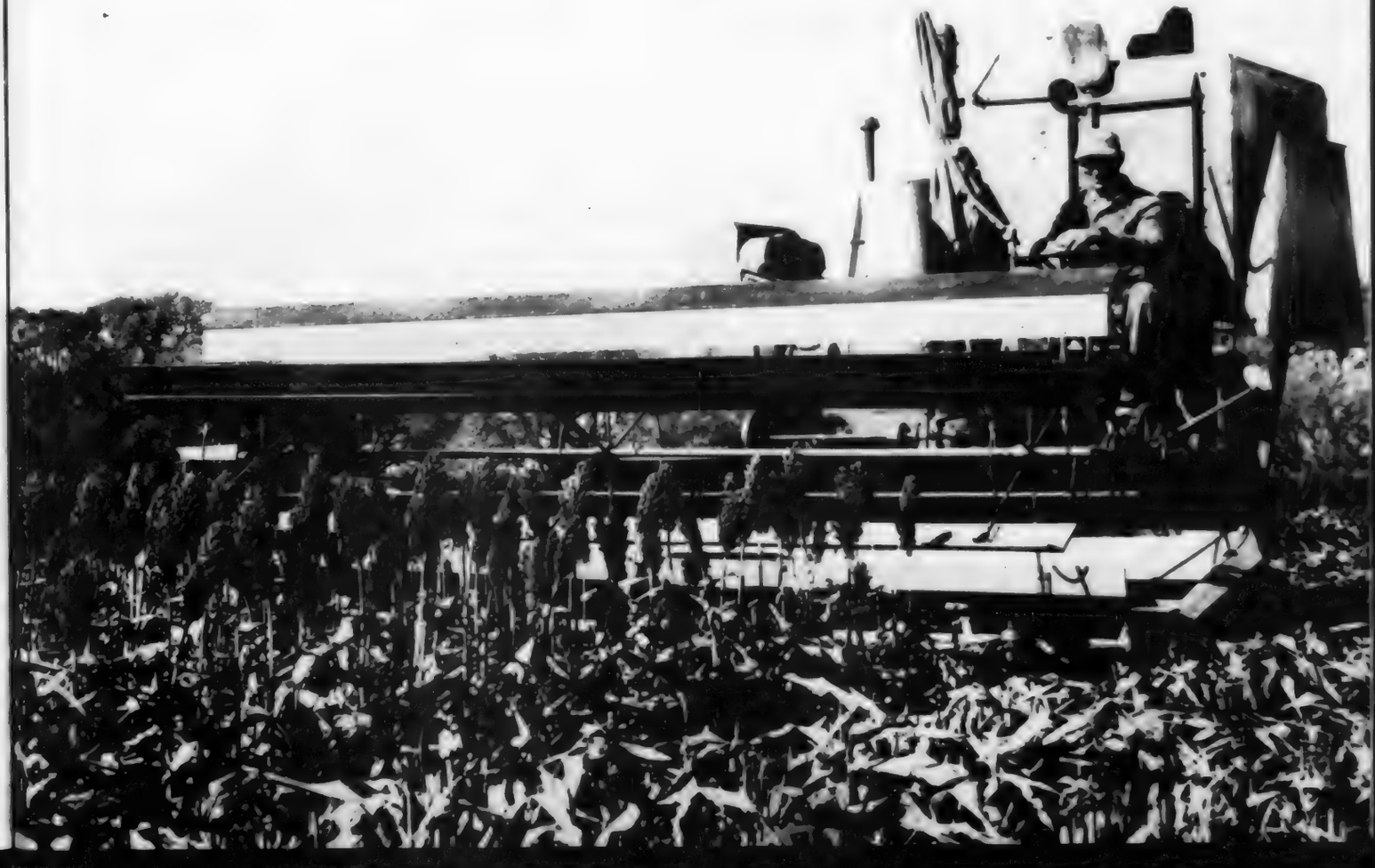
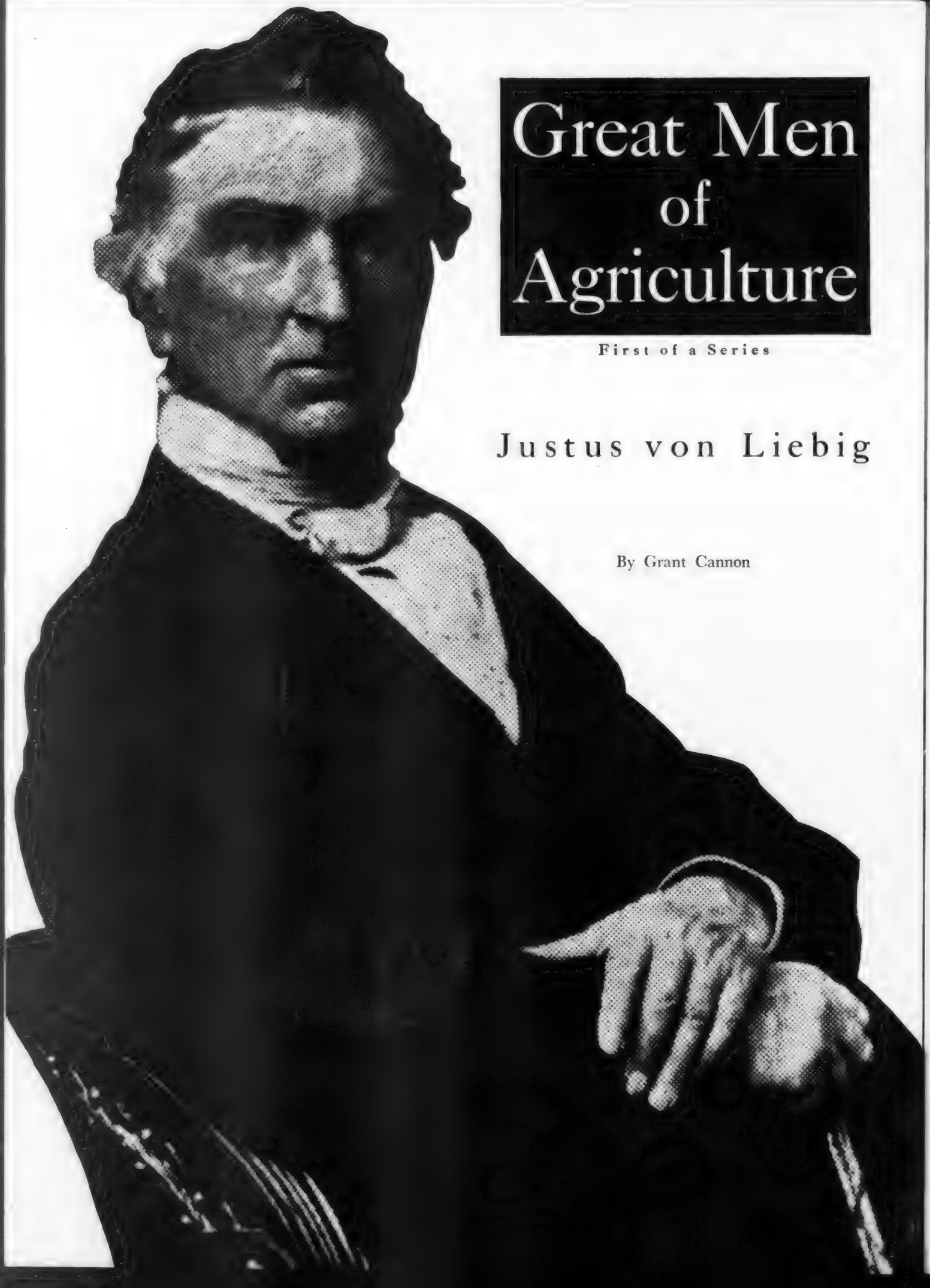


The method of producing seed of sorghum hybrids developed by the Texas Experiment Station. In Field 1 the male-sterile strains (the female parents) are maintained and increased. In Field 2, the seed-grower crossing block, the male-sterile strains are crossed with a normal strain to produce seed for the single-cross (A x B) hybrid grown in Field 3.



The dwarf sorghums are easily combined (below) with wheat equipment. Early maturity and dry heads are two desirable qualities that breeders are attempting to build into new varieties.



Great Men of Agriculture

First of a Series

Justus von Liebig

By Grant Cannon

JUSTUS VON LIEBIG was one of the great men who brought the light of science to mankind. Known as the founder of agricultural chemistry, he began his studies in a world where scientists believed that sharp cheese got its taste from lance-like atoms, and sponges were made of tiny bellows that sucked in water.

To most objects, the scientists of 1800 assigned a principle such as dryness, acidity or combustibility. Liebig cut through all this speculation by holding that behind every effect was not one cause but many. He influenced us all by his dogma of *inquiry and proof*. He sought the many inter-relationships that were hidden behind a simple agricultural fact.

Just one hundred years ago, European men of learning believed that plants ate humus just as the peasants ate potatoes and that the plants manufactured their own minerals through the use of a uniquely mystic vital force.

In 1840, when Liebig was 37 years old and in revolt against the chemists of his time, he threw a scientific bomb into his world of "philosophic investigators." Liebig marshaled together his own agricultural work plus the investigations of other scientists, and forcefully presented a body of knowledge which could be tested, repeated, measured, and analyzed, always with the same result. The publication of this work called "The Chemistry of Agriculture and Physiology" marked the beginning of agricultural chemistry as a science.

When Liebig was born it took nine farmers to support themselves plus one city family who carried on all the manufacturing, transporting, inventing, and governing. Today in America, one farmer feeds seventeen people. In parts of the world where modern agriculture is not practiced today, the old ratio of nine to one still prevails. The difference between these two ratios is the measure of the value of modern agricultural science.

The Man Who Became Chemistry

Justus Liebig was born May 12, 1803, in Darmstadt, which is in the rolling, wooded section of what is now southwest Germany, but which, in Liebig's time, was the Grand Duchy of Hesse. Liebig's father owned a dye warehouse and carried on chemical experiments in an effort to improve his products. Young Liebig helped. He was allowed to watch the neighborhood soap-maker mix the fats and lye which were boiled into soap, and he learned from the other Darmstadt tradesmen the arts of the tanner, the dyer, the smith, and the brass founder.

As with so many great men, Liebig developed early that singleness of purpose which later led one of his contemporaries to say, "Liebig is not an operator in chemistry; Liebig is chemistry itself."

What caused this boy to dedicate his life to a subject not even recognized as a science at that time? We have no answer any more than we know what caused the child Mozart to become the personification of music or what motivated the 16-year-old Einstein to speculate about the nature of light. He was encouraged by Hess, the Grand Duke's librarian, to read all of the books on chemistry which were available. Liebig read them without system or order. "I read the books just as they stood on the shelves, whether from below, upwards or from right to left was all the same to me; my 14-year-old head was like an ostrich stomach," Liebig said, and added, "I became indifferent to every other thing that ordinarily attracts children."

Liebig possessed what we call a photographic memory, and he thought in terms of phenomena. In trying to explain just what this faculty was, Liebig said, "It is not very easy to give a clear idea of phenomena to anyone who can not recall in his imagination a mental picture of what he sees and hears—like the poet and artist, for example. Most like this is the peculiar power of the musician, who while composing thinks of tones as logically arranged conceptions of a series of conclusions. There is in the chemist a form of thought by which all ideas become visible to the mind as the strains of an imagined piece of music." Curiously, Liebig was considered a very poor student at school. His strange memory retained all that he saw, but very little of what he heard; and in those days instruction was mainly by means of lectures.

When he was fifteen, Liebig's father took him out of school, a failure, and apprenticed him to an apothecary at Heppenheim. Liebig learned rapidly and at the end of ten months knew all the chemicals in the shop and understood their uses. At night in his attic bedroom, he carried on experiments of his own, one of which blew out the bedroom window. The cautious druggist decided that he would rather have a boy with a less inquiring mind and sent Liebig back to his parents.

After this second failure, Liebig barely persuaded his father to send him to the University of Bonn to study chemistry under the celebrated Kastner. Here Liebig experienced a terrible disappointment. Though he studied hard under this professor and even followed him to the University of Erlangen on the promise that Kastner would analyze minerals, such as apatite or limestone, with him, he found to his dismay that none of the professors used experiments as a basis for their findings.

Liebig instinctively sought "inquiry and proof," but his professors thought this vulgar. They felt that experiment and observation were pedestrian because the mind, unaided, did not arrive at an explanation by itself. Instead, they invented "philosophical explanations."

"The influence of the moon upon the rain is clear," one of them said in a lecture, "for as soon as the moon is visible the thunderstorm ceases."

At 19, Liebig received the degree of doctor of philosophy from the University of Erlangen, but he was still searching for chemical knowledge. His chemical training had come chiefly from his own experiments and reading; he had never analyzed a mineral because his professor didn't know how; he had never worked in a chemical laboratory because at that time there was not one laboratory in the world open to students. Experimental work was for professors only—the world's first closed shop.

At Cambridge University in 1822 the professor of chemistry was a country clergyman who came up once a year to give a few lectures. At Oxford, no college credit was given for attending the chemistry lectures.

Feeling that it was impossible to study chemistry in Germany or England, Liebig persuaded his father to send him to the

(*Continued on page* 108)

This old poster explains Liebig's law of the minimum which holds that yield depends on that growth factor available to the plant in the relatively smallest amount. So, the "minimum tub" will hold no more than its shortest stave, Kali (potash). As potash is added, yield increases until another limiting factor is reached.

Nineteen thousand naked broilers pass this point every 8-hour shift at the Swanson plant. Trussed up by both feet at the start of the production line, they are bled, scalded, picked, disemboweled, and cut up along an endlessly moving conveyor which winds around and among dozens of workers on two floors. Each worker takes a single slice at the bird—at the end only the two feet remain on the hooks.

Broiler Boom in Arkansas

By R. J. McGinnis

POULTRYMEN are like fishermen—when they gather around the hot stove they tell tall stories. More often than not their tall stories center around the "break-even" point—the price per pound at which they break even with their cost of production. When they get to bragging about how low their break-even point is, the first liar hasn't a chance.

During the last year in most broiler producing areas, the break-even point hovered so near the market price that many producers either lost money or made so little they had to delve into the family sock to eat. Many went out of business. There are empty broiler houses in many parts of the country today, waiting for people to eat more chicken to bring up prices. Poultrymen in the Maryland-Delaware area are thinking more about eggs than broilers.

But there's a different and refreshing story down in northwest Arkansas. Broiler raisers down there are eating high on the hog, regularly turning in the old car for a new one, and complaining only about taxes and death. They have been able to lower the break-even point, increasing the spread between the cost of production and the market price, low as it has been, to make a living wage. How have they done it?

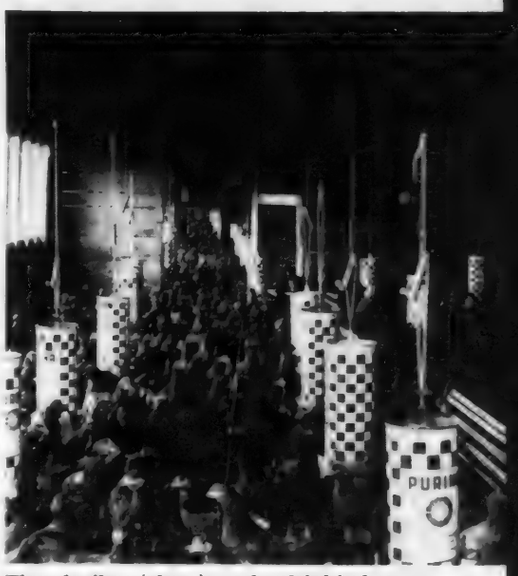
Northwest Arkansas got into the poultry business on a raincheck. Until the early thirties northwest Arkansas was fruit country, mainly apples and grapes. The area was dotted with fruit processing plants, most of them drying apples. Then the bottom dropped out of the apple market. Increased competition from the Northwest (Washington, Oregon, and Idaho), and the passing up of the dried apple for the canned variety, together with heavy insect invasions, sent the industry to the wall.

The fruit tree population of the state fell from 4,500,000 to less than half a million in a few years. Fruit farmers were left high and dry. Particularly hard hit were the two northwest counties, Washington and Benton. They had all their apples in one basket. The average acreage was small, the soil not too well adapted to general farming, and the terrain rough and rolling. What was an ex-fruit farmer to do? The choice narrowed down to dairying or poultry. Of the two, poultry required the smaller acreage and the least outlay of cash.

Those that went into poultry chose more wisely than they knew at the time. There were a number of favorable factors for the broiler industry not immediately apparent to those that turned to the chicken back in the mid-thirties to keep themselves off relief. One was the geography. Being centrally located, northwest Arkansas did not, and does not now, depend on any one market for an outlet. If you draw a big circle around Springdale, Washington County, Arkansas, the broiler capital of the area, you will see that it is smack in the center of a good many big chicken eating centers—Chicago, Cincinnati, Dallas, New Orleans, St. Louis, Kansas City, Denver, and not too far away from the ravenous West Coast. A vacuum in any one of these centers pulls broilers from northwest Arkansas. If one market is weak, the other might be strong. The area has no terminal market and its prices are more or less a reflection of prices all over the central part of the U. S. It is the most important poultry center west of the Appalachian Mountains and it does its own price setting as much as any highly competitive industry can set prices.

Another big factor in the prosperity of northwest Arkansas poultry is the price of feed. Its location on the edge of the big grain producing areas of the country permits a big price advantage in transportation. Grain is trucked in and mixed by a score of dealers, each with one eye on the grower and the other on competition. Prices are kept in line. Last summer a bag of feed cost $4.65 per hundred pounds. In bulk, as most of it was sold, it was priced at 25 cents below that figure, and cash took off another 25 cents.

Cheap heat is another advantage enjoyed by the Arkansas chicken grower. It is a poor farm indeed which does not have its own gas well, or easy access to cheap gas. L. L. Baxter, of the Arkansas Western Gas Company, which has done much to bring cheap heat to the area's brooder houses, estimates that it costs Arkansas farmers 2 cents per chick for heat bought from the company. The cost of propane gas heat and oil heat runs about 5 cents, and electric heat jumps to 15 cents. The grower with a gas well on his own place enjoys a no-cost heat which is a big factor in that break-even point—he's 2 to 15 cents ahead of the game before he starts.



These broilers (above) are hand fed in hoppers which can be raised from floor level for small chicks, to pecking height for the finished birds. The typical Arkansas chicken house (below) stretches on and on. The giant of them all is a quarter of a mile long.

Back in the mid-thirties when the first commercial cackle was heard in Arkansas, the broilers were shipped alive by railway and truck to buyers in Chicago, St. Louis, New Orleans, Texas and the Pacific Coast. Paying transportation on a lot of feathers and innards seemed a pretty loose way of doing business to some sharp businessmen of the area. Plants to process the broilers sprung up around vantage points in the two counties. Some of these were started by feed dealers, some by the growers themselves, and not a few of the former apple handlers got their thumbs in the pie. Big national outfits like Fox Deluxe Foods, Swanson's, and Chicago packers put up plants. There are now eight big processing plants in the area and there hasn't been a truckload of live broilers hauled out for almost two years, other than to processing plants in nearby states. O.P.A. regulations dealt the truckers a final blow in 1942.

One of the largest processors is the Swanson plant, recently merged with Campbell's Soups, which dresses 38,000 broilers a day, shipping them frozen in all sorts of fancy boxes all over the United States. This outfit originated the much advertised TV dinner, consisting of sev-

These broilers (left) have just come from the scalding tank and are on their way to the picker. In the picker the feet are released and they are tossed about, slapped with rubber paddles, and emerge naked as a jaybird except for a little fuzz, which is singed off in a gas flame. One of the pioneers in Arkansas poultry is Joe Pizza (below) a former grape grower.

eral pieces of pre-cooked chicken, a vegetable and a hunk of mashed potatoes done up in an aluminum plate ready to pop in the oven for reheating and eating. Chicken wings, drumsticks, and breasts that wind up on the fresh poultry counters of ten cent stores all over the country are prepared in these eight plants. When chicken meat went below the price of hamburger, the housewife knew the best buy.

Taking a leaf from the pork packers, the poultry processors of Arkansas marketed everything but the cackle. The feathers are being processed into a poultry feed. Feathers are 85 per cent protein, mostly undigestible in its raw state. Recently a method has been found to make it available to the bird and feather meal is now a regular ingredient of Arkansas feeds, although not yet cleared for interstate shipments. The viscera and waste go into rendering plants where it is processed as a feed for cattle, hogs, and more poultry. Worn out litter is being processed into cattle feed or, as manure, enriches the vineyard and pasture soils.

The processing plants can take up a lot of slack in the market. The day-by-day price of poultry on terminal markets is not as vital here when processing can go right on and the frozen product can wait and hope for a better market. A farmer can always sell his broilers when they are ready to go.

The climate and the terrain are no small items in this favored region. The winters are mild and the summers temperate, just what chickens like. Heat is not as important an expense as in the north. There is good drainage, a health item, and according to the natives, the water has a most salubrious quality especially designed to grow healthy chicks. Mortality hovers around 5 per cent, a good figure reflected in that famous break-even point.

Home Owned and Financed

One of the more important reasons why the northwest Arkansas poultry industry jumped to the nation's top ranks in a few years, and a good reason today why the growers are not singing the blues, is that the industry started out as a healthy baby. While credit is freely given and freely taken, the backbone of the industry is the family enterprise, home owned, home financed, and home operated.

The beginners back in the mid-thirties usually converted an old building or put up a cheap house, ordered a small batch of chicks, 500 or so, and bought enough feed to start the batch. There was no big outlay in equipment, and the labor came from the family. As the enterprise grew, and batches increased to five and ten thousand, and feed mounted into ton lots, credit was often needed. The feed dealers furnished the paper, but in almost every case, the farmer owned the birds, and took his profits and losses. The dealer took a chattel mortgage on the birds or other negotiable property. The dealers employ their own technicians who pay weekly visits to their customers, advising on disease control and feeding. When a poultryman is in trouble he thinks of these men more often than he does his county agent.

If the profits were small, the farmer simply wrote off his wage-per-hour, as farmers are inclined to do everywhere. Close personal attention, the incentive of keeping all the profit, if a profit was made, and home ownership did more for efficiency and good management than unlimited credit and business on paper. The chicken business was a means of livelihood, not a sideline, and the business had to pay or the owner and his family went hungry.

That is the basic management in northwest Arkansas today. The dealers limit their financing to feed and chicks, and occasionally equipment, but the farmer must own his farm and his buildings, and he retains title to the birds. Regardless of who finances him, he sells his broilers to whom he pleases.

The Arkansas broiler man might be called old-fashioned by

(*Continued on page* 103)

One of the reasons why the Arkansas poultry industry has prospered is that it started and has remained a home owned, home financed, home worked operation. Layouts like this—an old barn converted into a broiler house—were typical of the pioneer in Arkansas. There the chicken man has always been long on production and short on fancy buildings and machinery. Upkeep and depreciation are cut to a minimum on home owned property; when prices go down the farmer writes off his labor at a lower figure and hopefully puts in another batch.

The fruit cellars of our grandmothers were well stocked with products of the brambles—blackberry jam, currant jelly, canned raspberries for pies and tarts. The fruit came from the berry patch in the kitchen garden and the hedge along the back fence. Twelve boysenberry plants will yield 50 pints of fruit.

Small Fruit

A hedge of berries in the back yard will supply the family with fruit

"FIGURES LIE when it comes to growing berries," says Chris Kirschman of New Jersey. "You just can't get five times the profit from five acres of raspberries or blackberries that you can from one acre. It never works out."

Kirschman has a good many years of experience with bush fruits behind him. He has seen the innocent newcomers in the business, and the old line berry growers as well, jump to every innovation in varieties. "Berries run in fashions," he says. "For a time, everybody went in for raspberries. Then it was cultivated blackberries. Then it was get-rich-quick on loganberries or boysenberries until their limitations of climate and sales were discovered. For the past few years, blueberries have taken over. You wouldn't think anybody raises old-fashioned gooseberries nowadays, or currants maybe. But the older kinds sell right along, in the right area. In some areas, people don't know what blueberries taste like. In other places, blackberries don't sell at all. Raspberries sell 'most everywhere. I've got four acres of the old standard Latham red raspberry out right now and those four acres are the most profitable on my farm. In a good year, you ought to clear $1,000 on an acre of berries. In a wet year, the berries are soft and moldy. They won't keep. So you take a beating. In any year, you take a physical beating growing berries if you depend on them for a living. You earn every dime you take in."

Kirschman's 42 acre farm lies in the Cheesequake area of New Jersey, a few miles inland from Raritan Bay. His level acres of truck crops lie in patches, cut up by creeks and gently rolling hillsides. The soil on the slopes is a sandy loam, ideal for bush berries. Of equal importance is Kirschman's nearness to Newark and New York City, both insatiable markets within a few hours trucking distance.

"Berries are a very perishable product," Kirschman will tell you. "Like sweet corn, they are at their best for only a short time after picking. So before you go into commercial berry growing, you've got to be sure of a market, an outlet as near home as possible."

Getting started in the bush berry business does not involve a big cash outlay. For most varieties, sufficient plants to set an acre run from $150 to $200. Posts and wire trellises, where used, are minor expenditures. No special equipment is needed other than the normal tillage tools found on any farm.

How big a start should a side-line berry grower make? "We're all side-line growers," says Kirschman. "I don't know of anyone who makes a living on bush berries alone. It's not a year 'round business. Berries are always combined with something else, tree fruits mostly. Our main business is in peppers, tomatoes, and eggplants. A lot of pruning work with berries can be done when the vegetable season is over. The vegetables and the six to seven acres of berries keep four of us on the go pretty near all year around.

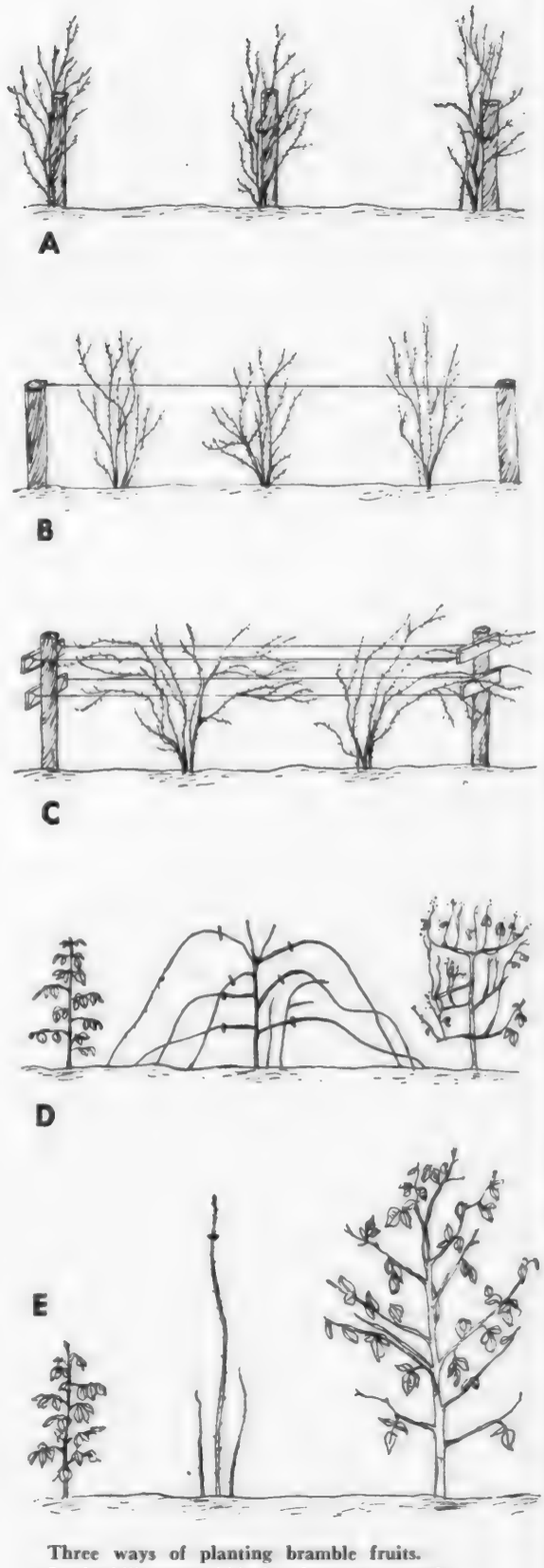
"I'd say a quarter of an acre of berries is about all a man would want to handle alone as a side-line starter and, of course, he'll need help at picking time. You can make more money doing a good job on a quarter of an acre than you can doing a slap-happy job on an acre. But in my opinion the best way to start is to raise a few rows of different berries in your home garden as a trial. We do the same with new varieties. I've got a trial plot out now on a new blackberry, New Jersey No. 16. You know how many plants I set out?—just three dozen. They are a good example of what to expect in the berry business. New Jersey No. 16 is bred especially for this area, but for me it's proving to be a poor yielder."

Bush Berry Culture

The culture of bush berries is largely the same whether restricted to a garden hedge or a plantation of large acreage. Commercial and home garden plantings differ only in one respect, if at all. On berry farms, varieties must be chosen that pick, keep and ship well even if flavor and quality must be partially sacrificed. Whether raised for sale or home use, all the brambles, blackberries, raspberries, and dewberries, as well as currants and gooseberries, deserve the best soil on any farm.

It is well to remember, whether planting on a small or large scale, to keep related berry bushes well separated in order to reduce disease hazard.

While bush fruits are not too fussy about soil types, they prefer reasonably fertile ground of high organic matter to retain moisture. Without adequate moisture during the critical periods of blossoming and fruiting, bush fruits fail. Yet they cannot stand wet feet. Well drained loams are best for raspberries and black-



Three ways of planting bramble fruits. In the hill system (A) the plants are spaced 5 to 8 feet apart, both ways, and supported by stakes. In the row system (B and C) one, two and three wires are stretched between posts and the vines trained over them. Which to use depends on the habits of the berry. The hill system permits the easiest picking conditions. Black raspberries, dewberries and some other trailing types spread from rooted cane tips (D). Tips should be buried in August, transplanted in the spring. Red raspberries (E) propagate from suckers.

berries, neither of which do well on light sandy soils that dry out quickly, or in heavy clay soils that bake. Because dewberries produce deeper root systems, they are drouth resistant, which enables them to succeed in lighter soils. All the bush fruits do best where the subsoil is open enough to permit deep root penetration. None are especially sensitive to soil acidity. A pH range of 5.2 to 6.8 is satisfactory.

The lay of the land is as important as the soil. Kirschman's sloping ground, less suited to vegetables, is made to order for brambles. The ideal spot is part way down a slightly rolling field, with good drainage and good air circulation to minimize the danger of late spring frosts. Low pockets offer the double threat of winterkilling from cold air and excessive moisture.

Windbreaks help prevent winter injury to the bushes and rapid drying of the soil and fruit during the summer. As most farm boys know, the best wild berries are usually found on the protected edges of thickets. Though protection is desirable, bushes should be planted at least 50 feet from windbreaks and shade trees and 30 feet from fruit trees to avoid competition for moisture and plant food. For small plantings, vegetable garden borders or trellises to one side of the yard are satisfactory, but since red raspberries and blackberries spread readily, they should not be planted near a line fence nor a perennial flower bed.

Getting Under Way

Bush berry plants are propagated in two ways, some by allowing suckers to grow from the roots, others by covering the tips of bent-over canes with soil until they take root. These suckers or rooted tips are transplanted to a favorable location until one year old, then are field set. Once a planting is established, expansion is a simple matter of planting the shoots from fruiting bushes.

Kirschman has had settings bear well for twelve years or more. "Ordinarily," he says, "I expect about eight years out of a planting—if winterkilling or disease isn't too severe. Those are the two big ghouls hovering over every berry patch. Sooner or later anthracnose or mosaic moves in. Anthracnose can be controlled by spraying. Actually, we're never really free of anthracnose, but once in a while it hits hard. When you use your own suckers or rooted tips for new plantings, you have to keep roguing them out to get healthy stock. Always set new plantings at a distance from old bushes, for plant lice and ants carry the diseases."

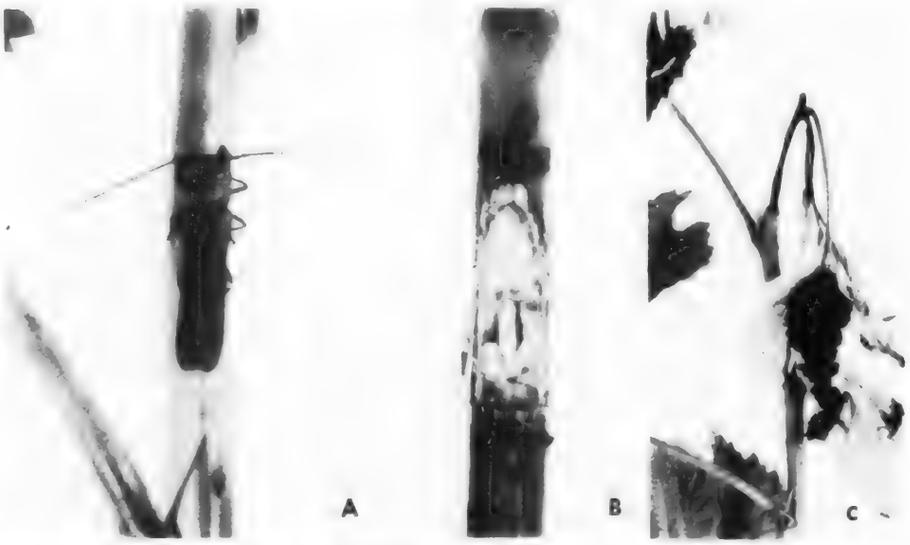
The purchase of disease-free stock from a reliable nursery, preferably one near enough to supply varieties adapted to local conditions, is the soundest beginning. Two year old plants are normally bought, with the expectation that they will bear lightly the following season.

Berry yields vary greatly with varieties and with the same varieties in different areas. For home use, a dozen plants of any of the brambles, blackberries, red, black, or purple raspberries, boysenberries or dewberries, normally costing between $2 and $3 a dozen, should be sufficient for the average family. Twelve plants will occupy about 40 feet of row at usual spacings and should yield between 25 and 50 pints per year for the row. Currant and gooseberry bushes yield from 4 to 6 quarts, with prices ranging from 25 cents to $1 per plant. On a commercial scale, average yields are in the neighborhood of 2,000 quarts per acre for brambles, with yields of 8,000 quarts per acre not uncommon under favorable climate such as in the Northwest. Average yields of currants and gooseberries run from 3,000 to 6,000 quarts per acre according to varieties, with west coast yields often exceeding 10,000 quarts per acre. Costs of berry bushes for commercial setting range from $65 per thousand up. County agents and local growers are the best sources of information on varieties best suited to any area. Almost all plants on the market are hybrids, often representing years of selective crossing to improve adaptability. Most bush fruits are self-pollinating, so only one variety need be planted.

Setting the Plants

Recently broken sod ground is no place for bush fruits. They should follow cultivated crops for better weed and grub control. Fall plowing permits earlier spring planting, with greater chance for good root development before winter again sets in. Kirschman works down his fall-plowed ground in March and sets the plants as soon as late frosts are unlikely. As with most nursery stock, raspberries, blackberries and dewberries should be set slightly deeper than they were grown in the nursery. Red raspberries, blackberries and dewberries are cut back to about six inches when planted. Black and purple raspberries are cut back almost to the ground, the single cane or "handle" being removed to reduce the anthracnose hazard. Gooseberries and currants should be cut back to 10 or 12 inches.

Most of the big growers, like Kirschman, use tractor-drawn plant setters. However, two men can do a fairly fast job of setting the plants either with a tractor plow or just an ordinary spade. With a tractor plow, a furrow is opened, the plants are set against the straight side of the furrow and partially covered by hand. A return trip of the plow fills the furrow and a third trip with the plow out of the ground firms the plants in place with the tractor wheel. In the hand method, one man opens the loose soil with a spade worked back and forth to form a hole.



Every plant has its arch enemy. With raspberries it's the cane borer, a slender, half-inch beetle with antenna as long as its body. The adults (A) puncture the tender cane tips and in these punctures the females deposit their eggs. The larvae (B) burrow down the cane; the wilted tip (C) which normally produces the best berries, dies.

Anthracnose (D) invades every berry patch sooner or later. Infection spreads rapidly. Canes are stunted or killed, yields fall.

One man can do all the work on a sizable plantation of berries—that is, until it comes picking time. Then additional labor is needed, for the ripening fruit does not wait. Child labor and minimum wage laws have closed off the best source of labor—school kids after school hours—in some states. Some have solved the problem by "pick-them-yourself" selling.

The second man drops in a plant and fans out the roots. Then the spade is withdrawn and the ground is firmed against the plant by foot. It is advisable to water the plants if the soil is dry.

Spacing of the plants depends on the system of growth to be used. For determining the number of plants needed per acre, the distance between rows is multiplied by the distance between plants in the row. This figure is divided into 43,560, the number of square feet in an acre, giving the required number of plants.

Kirschman prefers the hedgerow system of setting plants, with unsupported bushes 3 feet apart in rows spaced at 8 foot intervals. This calls for 1,815 plants per acre. Other growers prefer spacings from 2½ to 4 feet in the row and with rows from 6 to 12 feet apart, according to the width of the cultivating tools to be used. In the hedgerow system, shoots are allowed to come up anywhere in the row, but not between the rows. Among commercial growers, the hedgerow system is most commonly used for red raspberries and blackberries, both of which sucker wildly. By pruning and cultivation, most growers keep the rows to a maximum width of 12 inches at the base. Eventually the planting has the appearance of a solid hedge, a system often favored by home gardeners.

In the hill system, plants are set in squares of varying size for cultivation in both directions and for picking from all sides. Some like 5 feet by 5 feet spacing, some 6 by 6 or even 8 by 8 for the more vigorous growing boysenberries. Canes are supported on individual stakes or by tying together in the form of a teepee. Suckers are permitted to grow only close to the parent plant. However, the hill system is more favored for black or purple raspberries, dewberries and other trailing types (the boysenberry, youngberry and loganberry), all of which spread from rooted tips rather than from suckers. The hill system is also used for currants and gooseberries which are not ordinarily inclined to sucker or root at the tips.

The spreading out of plants is usually very restricted in the trellis system, which is more common in the far west. From one to four wires are stretched between posts set about a rod apart, the wires being one above the other or sometimes spaced on short cross arms at the tops of the posts. The berry canes are looped or tied to the wires into different patterns for easy pick-

(*Continued on page* 125)

Tillman Bubenzer with his hybrid pigs has turned part of Conner Prairie Farm into a seed-stock pig factory

Hog Farm grosses $250,000

Photographs by Joe Munroe

A NEW PRODUCT on the agricultural market and a new technique for hog farmers were introduced by the Conner Prairie Farms, Noblesville, Indiana, in 1952. The new product: three lines of in-crossed boars from production tested families which have shown superior ability to convert feed into pork and to produce high quality carcasses. The new technique—a rotational breeding program which does two things: (1) permits each of the boars to pass on hybrid vigor when mated to the farmer's gilts and (2) gives the farmer a herd that is 98 7/16 per cent production tested stock after using six boars, even though he himself never weighed a pig or a pound of feed or looked at a carcass.

In 1954, the third year this project was in operation, Conner Prairie sold better than a quarter of a million dollars worth of boars. This year (1955) is proving to be even bigger.

The production of the three lines of in-cross boars is a combination of assembly line techniques and an industrial division of labor. Each of the three lines of boars is the result of crossing two unrelated inbred lines. Conner Prairie breeds and rigorously tests the six inbred lines; they have turned over the job of combining these inbreds to produce the three lines of commercial boars to producer-farmers who, in industry, would be called sub-contractors.

In the beginning, the farmers who bought the boars fell into two classes, the adventurous fellow who gives every new idea a whirl, and the man who had made a study of genetics and was looking for ways to achieve hybrid vigor in his hogs. Today's customers are mostly neighbors of these men who have had a chance to see the breeding program in operation. The results have included such solid records as those of Sid Craig, of Pendleton, Indiana, who averaged better than nine and a half pigs raised from an all-gilt herd that produced over 1200 pigs last year, or Gilbert Brown, of Clay County, Indiana, who became the state pork production champion by raising 42 tons of market hogs in a year from a sow herd of 21. Sales are also stimulated when farmers hear Conner Prairie customers say, "This is the best bunch of hogs I've ever fed out," or "These pigs have fattened out on less feed than my old ones —I've still got a quarter of my corn left."

Hogs and Democracy

The man behind this revolutionary farming idea is Conner Prairie's German-born manager, Tillman Bubenzer. Bubenzer is a powerfully built man whose prominent blue eyes are surrounded by three sets of wrinkles which are characteristic of him; above them are arcking lines of concentration and worry; below are circles of fatigue, and spreading from the corners are deep lines etched by laughter.

The hog project is one of three seed stock enterprises—beef, hogs, and dairy cattle—being run on Conner Prairie Farms which, incidentally, is owned by Eli Lilly

In one of these test pens, every pig that gets into a Conner Prairie breeding herd spends 98 days of his life—from 56 to 154 days of age—proving his efficiency as a feed converter. The three-year average for all pigs is 320 pounds of feed for each 100 pounds gain. Don Fisher checks one of the self-feeders.

and is one of the historical spots in Indiana because of William Conner's success in bringing peace with the Indians: the peace treaty was worked out at this farm which he owned.

Every day, Bubenzer sits in his office over the farm garage, planning the work for this departmentalized farm and making decisions; but perhaps the most momentous decision of his life was made 27 years ago in another farm office in Germany. He had just completed his first year as a farm manager, had turned a profit on a farm which had lost money for years, and was eagerly awaiting the 10 per cent profit which had been agreed on as his share if he could produce a profit to be shared. In marched the chauffeur of the owner, a German nobleman, with an old set of the encyclopedia—the Count's present for a job well done. Bubenzer sent the books back. A few minutes later the Count, himself, stormed into the office demanding imperiously, "Who do you think you're dealing with?" Bubenzer answered with cold fury, "I thought I was dealing with a man of honor who would keep his word." In the explosion that followed the Count told him that he would see to it that Bubenzer never got another job in Germany. "Right then," Bubenzer recalls, "I decided to come to America."

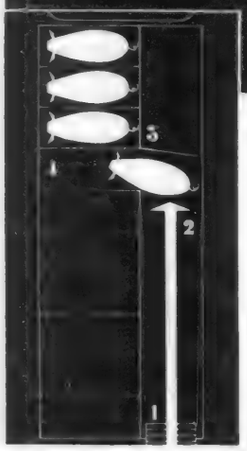
Two weeks later, the young farm manager was on a boat heading for America. In spite of this early experience, he has continued to deal with people as though they were men of honor and has insisted that they treat him in the same way.

Having been born in Imperial Germany and worked under conditions of rigid class distinction, it is not surprising to find Bubenzer intensely interested in preserving democracy here. The importance of individual liberty and the economy which makes this possible is a theme he manages to get into almost every discussion. When he talks of this new breeding boar project he says, in an accent that seems more French than German, "We feel that the farmer-owned farm which is so important to our way of life is being threatened because the livestock are inefficient converters of feed into meat. We feel challenged to produce an efficient, meat-type hog that will help the farmer increase the number of pigs he markets and reduce the feed it takes to bring them to market weight."

There are, of course, those who claim

Testing hogs has saved one-third of

Red, with spots, and a belt, this is certainly a cross-bred pig, but cross-breeding isn't the only answer. This pig ate 1,000 pounds of feed to make 200 pounds of gain and produced a lardy, low-grade carcass.



Don Fisher waters down a load of boars in the truck which he designed. In the background is part of what is called the Conner Prairie warehouse where the boars are held between collection from the farmer-producer and shipment to the buyer. The truck holds 20 boars in individual pens on two decks. It is so designed that any boar in any position can be taken out without disturbing the others. The plan below the picture shows how this is done. The boar is driven up the ramp (1) down the side alley (2) into the pen (4) where he is enclosed by the gate (3). He can enter and leave this pen without disturbing any other animal. If it is necessary to crowd the truck, hurdles can be placed in the side aisle to make extra pens like jump-seats in a crowded motor-bus.

Bubenzer is just waving the flag in order to sell boars, and others, particularly the purebred hog men, who acknowledge his sincerity, but question whether he is on the right track with cross-breeding. Few, if any, however, doubt the need for producing more efficient hogs.

Inbred × Inbred = Hybrid

An important milestone in the search for efficient breeding stock came in 1946 when Connor Prairie bought its first inbred line, the Minnesota No. 1, which had just been created by Dr. L. M. Winters, of the University of Minnesota, by crossing the Danish Landrace with the Tamworth. A year later, the farm acquired foundation stock of the Minnesota No. 2, an inbred line of Yorkshire and Poland China. At first these two breeds were raised and sold as individual, pedigreed stock.

As more inbred lines became available, the idea for the present program began to take shape. Dr. Winters, who had created two of these lines, was retained by Conner Prairie as a consultant and worked out the genetic problems while Bubenzer and his hard working associates, Don Fisher, Jim Ogle, Don Heinrich, and others concentrated on the production problems.

They decided to create three commercial hybrid lines designed to be used in rotation. For their C Line they crossed their Minnesota No. 1 with the Montana No. 1, which gave them a hybrid pig with 51½ per cent Landrace blood, 22½ per cent Hampshire, and 26 per cent Tamworth. The E Line was made by crossing San Pierre with Maryland No. 1 to produce a pig that is 44 per cent Berkshire, 31 per cent Landrace, and 25 per cent Chester White. For the F Line they crossed their Minnesota No. 2 with the Beltsville No. 2, which gives them a spotted pig with 49 per cent Yorkshire, 30 per cent Poland China, 16 per cent

the feed in producing a 200-lb. hog

This cross-bred pig has generations of feed conversion tests and carcass quality selection in his genetic background. He ate 600 pounds of feed to make 200 pounds of pork and produced a lean carcass.

The producer-farmer and the field man (above) check some new litters of C Line hybrid pigs. A veterinarian takes blood for a brucellosis test (below) from each sow before each breeding.

Duroc, 2½ per cent Landrace, and 2½ per cent Hampshire blood. As with all hybrids, each generation of these commercial lines must be made by crossing the original parent inbred lines—a C Line, for example, crossed to a C Line does not produce another C Line any more than a farmer's self-pollinated hybrid corn produces hybrid seed. This means that all six of the inbred breeds must be kept at the job of producing the breeding stock that goes into the crosses.

Faced with the job of producing the six inbred lines, which are their raw material, and combining them to form three commercial lines, Conner Prairie adopted the industrial system of sub-contracting part of the job to other farmers.

The 30 farmer-producers receive their breeding stock from Conner Prairie—boars of one of the two lines that make up a commercial line, gilts from the other—and combine them. Rigorous standards are imposed from birth to maturity. The boars and some of the gilts that survive the intensive culling are finally purchased by Conner Prairie and returned to the home farm for final selection and shipment to the customer. In this operation there are no "manufacturer's seconds"; all of the animals that are culled because they fail to meet the standards are fattened and sold for slaughter.

Testing the Inbreds

To keep up the production of the inbred lines at Conner Prairie, 35 sows are brought into the central farrowing house and put in the farrowing crates every six weeks. On the front of each pen is a record card to hold the information that is accumulated on each litter born. With farrowing, the first entry is made, the ease or difficulty of farrowing. Following this, Maurice Miller, the gentle, unhurried man in charge of the farrowing barn, enters the ear notches, sex, number and location of teat spots (Conner Prairie believes that the even spacing of the teats is almost as important as the number), and the birth weight. At this point the first culling takes place. Any sow or gilt that fails to farrow eight live pigs is eliminated and the litter discarded. "We consider the culls that accumulate as we go along nothing but offal," Don Fisher, who is directly under Bubenzer in charge of hog production, said. "They have a value, just as the metal shavings accumulated by a machine shop have—but not for us to exploit. We have a contract farmer who takes them off our hands and fattens them out for market."

For about 21 days the sow and pigs are held in the farrowing pen. Twice a day the sows are taken out for feed, exercise and sunlight, and to relieve themselves on the concrete slab where their droppings can be more easily cleaned. The rest of the time they remain with their pigs in the barn, half of which is air conditioned with a heat exchange unit (as an experiment), the other half being ventilated by fan.

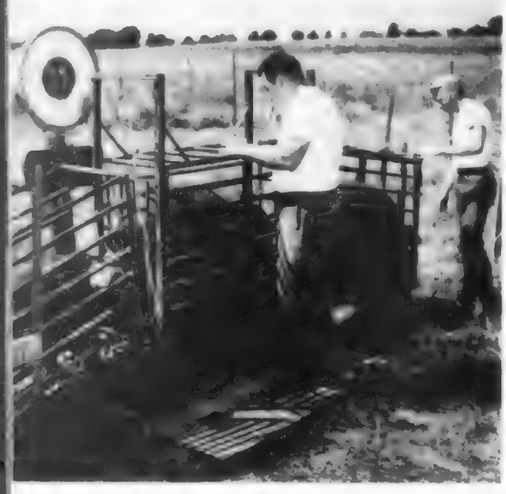
The anemia problem has been solved by giving each pig a squirt of a preparation called Swi-Ron at three days, a week, and again at two weeks. This mineral and vitamin material has the consistency of peanut butter and it takes a pig an hour or so of licking to get it off the roof of his mouth and down his gullet.

After three weeks the sows are taken from the farrowing pens and put out in the breeding lots. The pigs remain in the pens for another week, or until each of them has cleaned up five pounds of the Iowa 75 prestarter which was formulated by Damon Catron of Iowa State College.

At four weeks 24 of the 35 litters are moved to a wing of the farrowing barn set aside for growing the young stock to the normal eight-week weaning age. In

A three-pound pig with many brothers and sisters is the goal. During the past three years litters have averaged 10.6 pigs.

The three-year average for weaning weight is 36 pounds at 8 weeks. The instrument above the scales records temperature and humidity.



At 154 days, individual weights give growth and feed conversion figures. The average weight is 181 pounds; feed ratio: 320 feed to 100 pork.

making this shift, at least 11 litters must be eliminated. Some of these may have been dropped because of small litter size; the others are culled on the basis of birth weight, rate of growth, number and location of teat spots (they must have at least 12), any defects such as rupture or ridgling, and such conformation points as body length and firm underpinnings.

A significant fact in this culling procedure is that entire litters are eliminated rather than individual pigs. Throughout the entire testing and culling program at Conner Prairie, the emphasis is on producing entire lines with high averages in litter production, feed conversion, and the other important factors, rather than either outstanding individuals or even families.

As soon as the pigs are moved to the growing wing, the farrowing sections of the barn are cleaned and washed down with hot lye water under 300 pounds pressure.

In the growing wing, the pigs are housed by litters in pens equipped with heat lamps and automatic poultry watering cups. Their feed is gradually changed from prestarter to a regular starter mixture. At six weeks they are given shots of serum and modified virus for cholera, and at eight weeks they are ready for the feed conversion tests.

Before going on test the pigs are weighed again and the average weight for the litter figured. At this point, the boar pig which comes closest to the average weight for the entire litter is castrated and all other boar pigs which are lighter than he is are also cut. This drastic culling reduces the boars by half, but it is not the only culling that takes place at this time. Any litter which has less than eight pigs raised to eight weeks is also eliminated as are any litters which have done poorly during the growing period.

The litters that survive this third elimination are moved out to the concrete feeding slab for the feed conversion tests. "We feel that the only honest feed conversion figures must come after the early, fast, cheap gains are made," Bubenzer said. "We also feel that the feed conversion of the entire litter is the only reliable basis for judgments. We know that there is greater variation between pigs of a single litter than between litters—so what does a feed conversion test on the best pig in a litter prove? If we thought it proved anything, we'd save ourselves a lot of money by testing one instead of the whole litter."

While on feed test, each litter is penned into its own section of slab. Feed for the entire litter is weighed into the hopper twice a week and the pens cleaned at the same time. If a pig dies during the test, all the feed consumed up to this point is noted and the rest of the litter goes on with the test. At the end of 98 days, the pigs are weighed and the total feed consumed is figured. By dividing the pig weight into the feed weight, they are able to find the amount of feed it has taken to make 100 pounds of pork.

To date the best feed conversion record was 247 pounds of feed for each 100 pounds of gain. But these men do not publicize the outstanding; they are interested in averages. The average feed conversion for the entire six breeds for the past three years—winter and summer, rain and shine—was 320 pounds of feed for each 100 pounds of gain. "That one figure is a concrete example of the effects of our selection program," Don Fisher said. "In seven years of testing and selecting, we have been able to reduce by 100 pounds of feed the amount it takes to make 100 pounds of gain. That is one of the important genetic characteristics we are selling to the farmer."

At the end of the feeding tests, one representative barrow from each litter is sent to the slaughter house for a carcass test. After slaughter, the head is split and the nasal passages examined for any signs of rhinitis (this disease hasn't shown up so far), the body length is measured from first rib to aitch bone, and backfat thickness is measured. This last measurement is correlated with live measurements taken with the electronic needle designed by Dr. F. N. Andrews and Dr. R. M. Whaley of Purdue University for measuring backfat on the live animal. As skill in the use of this needle is acquired (and they have found that it does take some practice to get accurate readings), they plan to apply this backfat test to the live animals as well as the carcasses.

With all of the tests completed, Fisher is ready to make the final selections for the breeding herds. Small litters were eliminated at birth, litters that didn't have the vitality to raise eight pigs to weaning weight were also eliminated along the line, roughly half of the boars were castrated at weaning, and now he knows how the litter did as feed converters and what kind of carcasses they produce. First he culls out all individuals who didn't weigh at least 160 pounds at 154 days of age. Then he throws out any pig that has developed any physical defect. The feed conversion figures and the other records are then used against the pigs. Minnesota 1, which uses more feed to make pork (an average of 345 pounds per 100 pounds of pork for the past 3 years) is culled most heavily on this factor; San Pierre, which has the smallest litters (a three-year average of 9.89) has a heavier weight placed on this factor. In each case, the weight given any one point is designed to improve that particular line of hogs.

The animals which survive this final

(*Continued on page* 131)

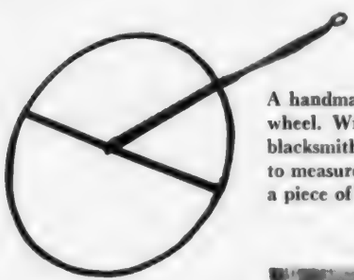
A barrow from each litter is slaughtered and tested for backfat thickness, lean meat percentage, and rhinitis. The tattoo on the back was applied at the farm when the pig was selected.

THE FARM a century ago

IN COOPERSTOWN, New York, at the Farmers' Museum the tools, the crude art, the original furniture and warm hearth of a pioneer American farmhouse have been gathered together. The people responsible for this remarkable restoration are: Dr. Louis C. Jones, the Museum Director (shown at the left with a large wood carving of a dancing Negro); George Campbell, Janet McFarlane; and the late Charles VanHorne. Every day the old farmhouse at Cooperstown comes to life; in the early morning, bread is baked and cheese is cut with the cheese harps and put into molds just as it was a century ago. In those days, "do-it-yourself" was not a fad; it was a necessity. A candlestick was made from a bar of strap iron. The job of making the new hay and barley forks was saved for the snow-filled days. Then the farmer sat down in front of the fireplace and went to work with a drawknife on the tough, flexible pieces of second-growth hickory that had been carefully selected the summer before. The fireplace was the center of all the farm life. From it and the beehive oven beside it came an endless procession of meals, rich with food that stuck to the ribs; meat, roasted on the spit; baked beans, simmering in a pot layered with molasses and thick slabs of bacon; rye bread and snapping crisp molasses cookies. Close by the fireplace you could keep your backside warm. By the north window it was cool enough for the cream to clabber slowly in the flat pans. Beyond the front door and hall was the parlor, seldom used, except for weddings and funerals, and of course on Christmas Day. Just off the kitchen was the bedroom. It was cold, but once you sat down backwards off the stepladder, the deep feather bed wrapped you snugly in its arms. Painting as an art was practiced mainly on chairs and chests, but wood-carving was another matter. There were gay children's toys, weather vanes, butter molds, and grain scoops. And, because they were honestly made, and useful, they were articles of great beauty too.

Photographs by Kazik Pazovski

The tin weathercock (above) is like the ones that topped many a barn along the Hudson Valley. The homemade doll (left) was the happy discovery of a farm girl on Christmas morning. She has a cloth body and is stuffed with rags. The blue and white dress and bonnet were left over from the new dress that Mama made.



A handmade race wheel. Wrought by a blacksmith and used to measure the length of a piece of iron.

The big guest bed is covered with a cotton bedspread. It is a candlewick design with French knots. The border has round medallions in a spider web design with an eight-pointed star in the center. The initials "M M" and "1825" are in a laurel wreath.

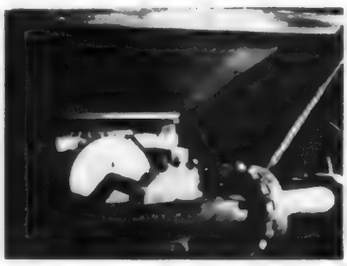
This spiral candlestick has a wooden base and an ingenious strap iron top. There is an opening along the spiral and a sharp hook set inside. As the candle burns the hook is slid up the spiral to raise the candle.

A carved wood whirlagig from Quakerstown, Penna. The figure is an Amish minister with the buttons removed from his coat. His arms revolve happily in a brisk wind.

Functional and beautiful,

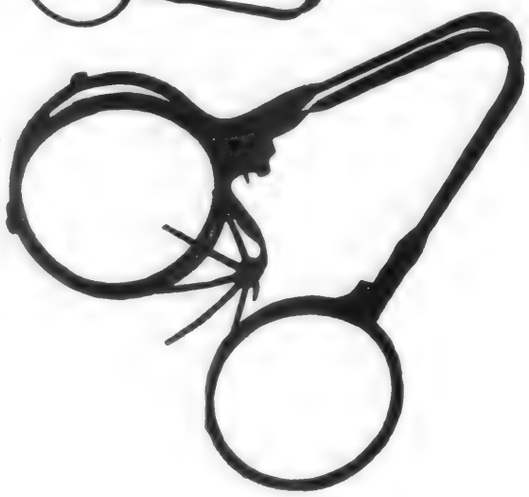
This big grasshopper weathervane was made by Cushing and Sons of Waltham, Mass. About three feet long, it was hammered from sheet copper, zinc and brass tubing.

The long, flowing lines of this cast iron plow gave the farmer the same pride of ownership as a new Cadillac does today. It was supposed to free the farmer from all the troubles of broken plow handles. Following it for a day buoyed the spirits but didn't help much with tired feet.



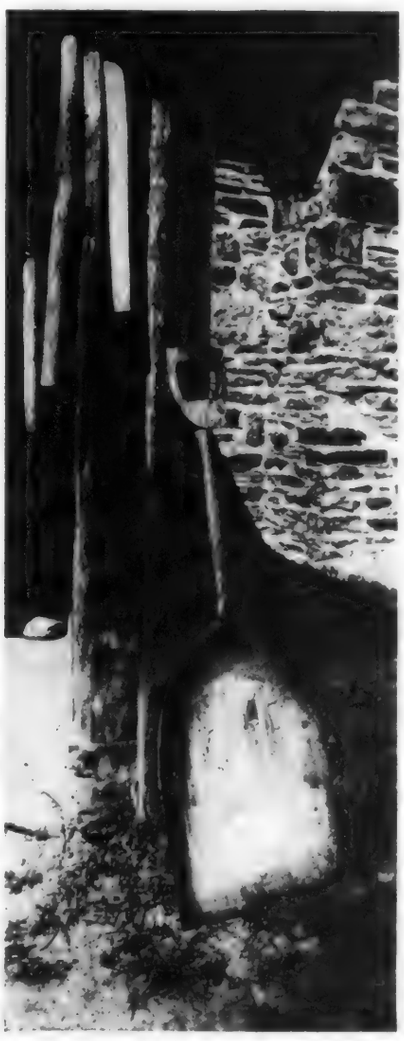
The handmade barley fork (extreme left) is a masterpiece of beautiful design. The fifth finger extending vertically from the handle kept the sheaf from sliding. The hand-made all-wood corn planter (left) had an intricate gear system to take the power from the wheels. It is characteristic of the early gadgets from which modern farm machinery developed.

A skunk, mink or weasel trap made of wrought iron was set astride the entrance to the den. When the animal pushed its head against the claw-like trigger the three loops were released and pop went the weasel.



These two inventions were among the thousands that were designed to save time and labor for the farmer. The grain cradle (above) was a great improvement on the simple scythe, for the fingers lay the grain in swaths of the right size for bundles. The hay harpoon (right) was a huge corkscrew that was screwed into the hay on the wagon to lift it to the mow by means of a rope and pulley.

these were the tools and decorations a century ago



A sturdy cherry grain scoop like this one was a necessary farm tool, and it gave its maker a good excuse to spend hours on end in the barn with a chisel, drawknife and occasional nip of hard cider.

As the upstate farmers brought their oats and hay down the Charles River to Boston Harbor they could see this gay lady, the welcoming sign on a floating night-spot, anchored safely beyond the prying eyes of the Watch and Ward Society. She was carved from pine and covered with plaster, then polychromed and gilded.

Stoddard Jess looks out over his fish-filled pond that waters his alfalfa that feeds his turkeys that produce the manure that feeds his crop of worms that feed the fish. Friends believe that here is a man who will some day solve the old riddle of perpetual motion.

Turkeys, Fish and Worms

Stoddard Jess turns his problems into enterprises on his Mojave ranch

By C. W. McCullough

A MILLION WORMS a day, a million trout a year, 55,000 turkeys a year, and 200 acres of alfalfa make an odd combination of crops for an 800 acre ranch, particularly for one located in the heart of the hot, forbidding Mojave Desert of California. Yet the crops are no stranger than the way Stoddard Jess, the owner, fitted each one into an operation grossing a million dollars a year.

Although only a hundred miles from the Pacific Coast, the Mojave Desert is cut off from coastal rains by towering mountain ranges, the Sierra Madres to the west and the San Bernardinos to the south. It is an austere land of heat, dust and spiny vegetation except in a few areas where water and a long growing season turn the desert into an amazing garden. The presence or absence of water draws a sharp line between farmlands and desert; the desert cactus and Joshua trees grow right up to the highline irrigation ditches.

In 1955 it may be difficult to visualize the present Stoddard Jess ranch as the outgrowth of the original 160-acre abandoned dude ranch of the depression years, upon which Jess' uncle had spent and lost a fortune. The place that young Jess took over was a picture of utter desolation that the desert was trying to hide beneath tumbleweeds and shifting sands. Trees were dead, buildings had lost their paint, roofs were falling in, and rats had taken over the chain of guest cottages. The dude ranch had been built for show, but the show was over and the mortgage holders were glad to arrange a settlement if Jess paid the delinquent taxes.

Even to accomplish this and to raise capital to begin rebuilding the ranch was a major hurdle. Jess had no money of his own. He'd been working for ranch-hand wages for years and was out of a job at the time. That first dealing with a banker marked the turning point in his life. He established a credit rating, and he made it good with his own hands, working from daylight until dark at painting and repairing the most essential buildings, cleaning out the deep well, restoring waterlines and irrigating a small field that had survived the ghost period.

His first success was built on turkeys and they still bring him most of his income. Young Jess knew nothing about turkey culture, but part of the usable equipment on the place consisted of chicken coops, runways, and a brooder house dating back to the guest ranch days. He formed a partnership with an experienced turkey breeder, who, like himself, was broke. Utilizing Jess' credit, they bought 2000 poults and set themselves up in business, a business that Jess found himself running alone when his partner proved untrustworthy.

"I made plenty of mistakes," he admits, "but some of them taught me that it doesn't always pay to follow the beaten path. I followed some screwy byways and shortcuts."

With a facility for making the impossible possible, he threw overboard some of the bugaboos of other turkey raisers such as the belief that the birds could not be cooped up or survive periods of cold, damp weather. Year after year with larger and larger flocks, he proved that death losses under these conditions were primarily nutritional and could be minimized with proper diet.

Like corn, a fish worm has both sexes. They may mate (right) though it isn't necessary in order to lay fertile eggs which look like black dots among the fast-growing young worms. Old worms make good fish food. Fish feeding (below, left) is necessary in this over-stocked lake. A million trout are grown here each year. The ranch has its own packing plant (below, center) where they are cleaned, packed, and frozen. Turkeys are another big cash crop on this ranch. Here are some of the 50,000 poults (below, right) raised to roasting size each year.

The feed formulas he developed have been so successful that he now markets some 55,000 mature turkeys annually. He also hatches and sells around 100,000 poults to other turkey raisers.

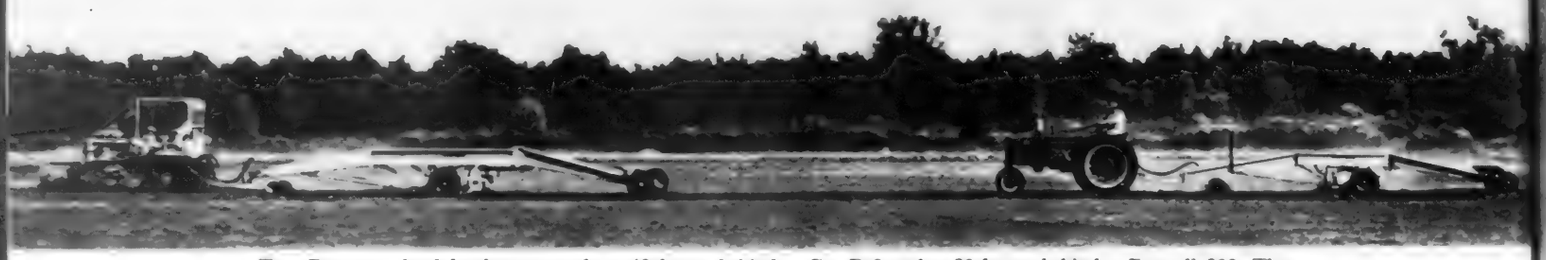
Jess is a small, wiry man, weathered and tanned by long association with the desert. A stranger looking in on the ranch will probably find him with a two days' growth of beard, wearing a cowboy hat, faded jeans, and a blue shirt, and working harder than any of his helpers.

Alfalfa has become his principal farm crop and a vital part of his turkey feed. His first five acre planting was to create a spot of green around his buildings and to control the tumbleweeds that grew rank where he spread the pen cleanings from the turkey runways. His deep well supplied enough water for irrigation and the little patch yielded so heavily that he decided to increase his acreage. Increased acreage produced surplus hay which he sold to other ranchers. Quick cash was one thing that he desperately needed to meet the costs of improvements and the increasing payroll.

Jess found another need for this hay money. He dreamed of building his holding into a great ranch. He began to buy bits of adjoining land which the owners were willing to sell cheap—if they could get cash.

But expanding his haylands created a new problem—water. To flood all his fields through the long, hot growing season required a head of water that his one well could no longer supply. Wartime restrictions ruled out additional pumping equipment. The only solution he could figure out was water storage.

(*Continued on page* 76)



Two Eversman land levelers at work, a 40-footer behind a Cat D-6 and a 30-footer behind a Farmall 300. They iron out the high spots and drop the dirt in the pot holes. Earlier planting and harvesting are the first benefits.

Land Smoothing

By Fred Knoop

MAUD FOBES backed the farm pick-up alongside the shipping dock. "You think you can put a land leveler in *this*?" she asked the shipping clerk cautiously.

Half an hour later she had her answer. "There you are, Mrs. Fobes," he said, as he tossed a bag of bolts and washers on the bed of the truck, "and here are your instructions. You and the Mister should have a 30-foot land leveler out of these pieces in about a half day. Course it says 'a few hours' in the book, but I always like to allow a little extra time."

A week later and back home on the farm in Wisconsin, Charlie Fobes was busy on a field that was going into wheat, when a neighbor drove up to the fence, held down the barbed wire, and hopped over. Like most of the farmers who came to see the leveler at work, his first question was, "Why do you want to smooth this field. Charlie, it's already so flat it won't drain good?"

Charlie Fobes got down off the tractor seat, rubbed the kinks out of his back, and explained, "That's what I thought about this field, too, until I saw the job Professor Wojta from the University and the local Extension and Soil Conservation people did on the George Groves farm near Gilman. George used to have his fields laid out in 'beds,' with ditches every three or four hundred feet that ran downslope. The trouble was the water was held in the beds because the dirt from each ditch had been thrown up on the edge of the bed.

"The job they did over there turned that field from a pasture where Groves' cattle would sink down to their knees every spring, into a quick draining, respectable field. The first thing they did was lay out a new drainage system. The main ditch runs directly down the slope. It serves as an outlet and was built so it had easy, sloping sides. They were made with a road grader that had a 10-foot blade. The cut was made so that it was just a foot deep at the middle of the ditch, and each side sloped up for 10 feet until it met the field level. Now I don't mind a ditch like that because you can run over it with any kind of equipment without shearing bolts. The fall needs to be only 3 or 4 inches in 100 feet, too."

Fobes had spent a good deal of time on his problem, and he had all the facts and figures at his finger tips. "The lateral ditches," he continued, "spaced about every 200 feet, run across the slope and are only about 6 to 8 inches deep and about 10 feet wide across the top.

"These channels intercept the surface water and carry it across to the drainage ditch. Even in downpours like we had last summer, they'll slow the water down and protect the land from erosion. These mild channels work well with slopes of 4 percent or less; that will cover my fields."

Then swinging his arm around his own work, Fobes said, "What I'm doing now is using this 30-foot Eversman land leveler as an automatic smoothing device. Before I started work with the leveler, though, I disced the whole field a month ago, to kill out the grass and weeds. Trash under the leveler blade makes it hard to do a good leveling job. I had our township road grader over here to cut the outlet ditch and then for the cross channels we used the local Soil Conservation District's wheel scraper; it's a 5-yard Caterpillar and it did the job fast, hitched back of a D-6. I've smoothed off all the dirt that came from the ditches, and I'll run the leveler around on the field now until it keeps just a light roll of dirt in front of the blade. That's what is called automatic leveling. The long 30-foot wheelbase does a good job of field smoothing. First you make the runs by eye, moving the soil from the higher field areas to the low spots. After you get this done you use definite patterns, diagonally across the slope, then around and around the outside of the field, working toward the center. Then you finish by running up and down the slope.

"Professor A. J. Wojta, who has done more smoothing work than anyone in the State, put it on the line for me." Fobes took a crumpled piece of paper out of his pocket and read off what Professor Wojta had listed as the big advantages of land leveling in Wisconsin:

"(1) Standing water is eliminated; so a field can be planted one to two weeks earlier in the spring.

(2) The whole field is ready to plant at the same time, and harvest at the same time, too.

(3) Summer rains won't drown out a crop or keep you from combining and harvesting the crop.

(4) If the field is dry enough for machinery to work in one area, it will be dry enough all over. The pot holes and wet spots are eliminated.

(5) Crop yields are better because moisture is retained longer in dry weather and the damaging effect of heavy rainfall in wet years is smoothed out by giving standing water a chance to run off in an orderly fashion.

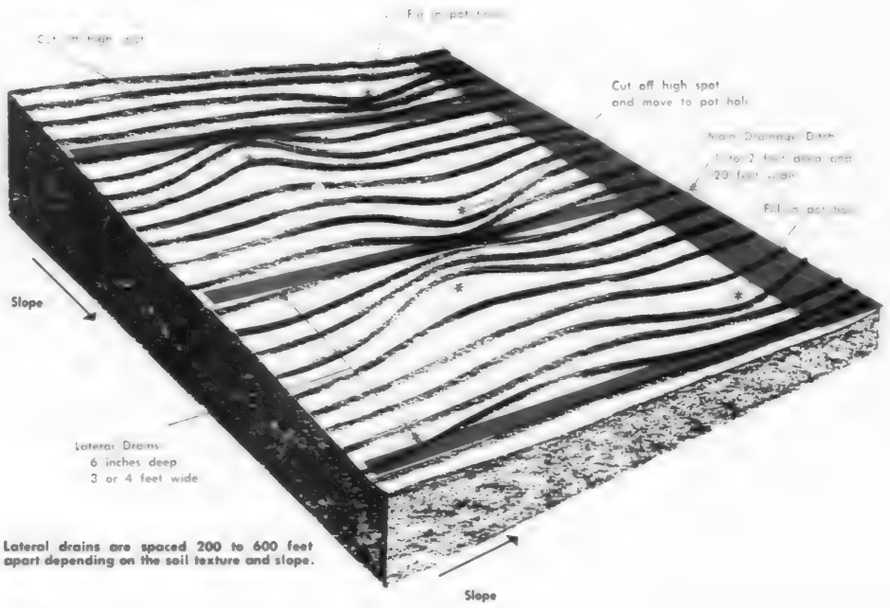
(6) If you do sprinkler irrigation, the leveling job will increase the benefits greatly, by eliminating puddles and giving even over-all distribution."

Charlie Fobes went right on talking as he climbed back on the tractor seat. "It looks like we've come to the point in this part of the country where we need to clear the fields of water just as we once had to clear them of rocks and stumps. Costs are 8 to 25 dollars an acre if you hire someone to do the work, depending on the amount of dirt-moving work to be done. I don't suppose it is much cheaper to own

"It's just like planing a board," two Wisconsin farmers agree. The land leveler does the job automatically, if you pull it around the field for a long enough time. When the blade hits a high spot it shaves it off; the dirt is picked up in the scoop just back of the blade and carried to a low spot in the field where it falls out.

The first job to be done in any field smoothing is to loosen up the ground so that it can be picked up and carried where it is needed on the field. A 24-inch Rome one-way bush and bog disc is being used (above) a month ahead of the time that the field is to be smoothed. Once the grass and weeds are killed the smoothing can be done more easily, for the trash will not pile up under the blade. The Engler hydraulic wheel scoop (right) is being used to do a rough earth-moving job on an Arkansas wheat field. In the drawing (below) the red indicates the way the field or lateral drains will be built across the slope as the smoothing is being done. Smoothing work for a field that is to be used for irrigation requires much more accurate layout and final leveling.

TYPICAL LAND GRADING JOB FOR GOOD DRAINAGE



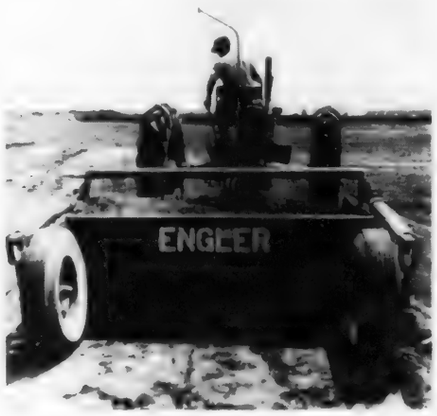
Lateral drains are spaced 200 to 600 feet apart depending on the soil texture and slope.

a leveler like my 30 footer at 800 dollars, but I figure I can do the work in my spare time. Then they say smoothing is a job that has to be done lightly each year for 2 or 3 years before you get the fields right. And the leveler does a good tillage job, breaking up clods and smoothing out implement scars. I want to take it slow and easy and not skin off all the top soil on the high spots. Where it does get moved off I'll lay manure on it right away."

Arkansas Travels Fast

One of the least likely places for irrigation would seem to be the rich, damp eastern valleys of Arkansas where the Lord has blessed the farmers with an annual rainfall in excess of 50 inches. Yet, in Arkansas, over 300,000 acres have been put under irrigation since 1952, and that is exclusive of rice acreage. "Our farmers are discovering that irrigation does best after land leveling," says Hollis R. Williams, State Soil Conservation Director. "We know of more than 7000 acres of land that was leveled by Soil Conservation District Cooperators last year; this year it will run double or more."

The Mack Brothers farm is one of the big, diversified farms in Eastern Arkansas



where cotton has given ground to other crops. It is near Newport in Jackson County and on this flat, fertile land near the White River, Leonidas Mack divides the 2300 acres this way: ¼ to rice; ¼ to cotton; ¼ to small grains, followed in the early summer of the same year by soy beans; ¼ to pasture, mostly Bermuda grass for his 500 cow herd of Herefords.

"Mister Mack" is a young man of tremendous energy, a director of the ASC, chairman of the local Soil Conservation District, and mighty hard to catch up with as he covers the operations of the farm at a fast canter in his open Jeep. Once you catch up with him, he'll relax with a foot on the bumper and give an accountant's look at the farm operation.

To Beat the Devil

"Land leveling, Suh, is doing us a three-way job," says Mack. "We need it first thing in the spring for land drainage so

(*Continued on page* 80)

SCS man Lyle Bobeck (left) worked out the details on this land smoothing project for Leonidas Mack of Newport, Arkansas. The 110-acre field was surveyed and grade stakes placed every 100 feet, in each direction. From this survey a complete topographic map of the field was made. The cut-out contour profiles gave Mack (right) a graphic demonstration of where the cuts and fills were to be made.

The Face of Winter

The year has two faces -- a lovely, smiling face for summer, flushed with color and warmth; the features of winter are austere, unyielding and demanding. Man has turned both to his needs and comfort

Saturday night rolls 'round inevitably for the small fry, and with it the weekly ordeal of the bath in the wash tub in front of the kitchen stove. The cold nips at the bare skin in the drafty kitchen, but once you are under the water you have a most wonderful feeling of animal comfort and you don't want to get out, dripping and twice as cold. The carrying and heating of water is a chore too, and sometimes if the kid is small and not very dirty, a grownup feels justified in using the same bath water. Any way you take it, the Saturday night bath in an un-plumbered farm house is no joke and after it's over you have a special feeling of having accomplished something. It's a good thing this rugged old custom is dying out, thanks to hot and cold running water and a regular bathtub.

Who hasn't marveled, from the warm side of a window, at the designs that the Frost King works out during a cold night. He's at work too, in the fields and woods, where he does a little different job in another medium. Take a blade of wheat. All the artists and scientists in the world, working together and forever, could not reconstruct this simple little design in green and hoar frost and snow. For whom is this rigid creation made — repeated and repeated a million million times over the winter earth; and why, and by whom planned? We haven't the answers, but we can see and marvel, and perhaps reach a humility we could all profit by.

A FEED RACK

that Tames the Bully and Saves Feed

WATERING THE ELEPHANTS used to be a good way for a kid to see the Big Show. That is, if he were still able to stand on his feet at the end of the job. It took a lot of trips to the pump with a 2½-gallon bucket to quench Jumbo's thirst.

The modern beef feeder and dairyman frequently find themselves in the same predicament trying to keep hay before their herds. The portable rack shown here, one which has been given an almost universal stamp of approval by the various state extension stations, is a real help in solving this problem. It has a capacity of some 350 cubic feet, sufficient to hold about ⅔ of a ton of hay, or enough to last a dozen head of cattle 3 to 4 days when fed at the rate of 30 pounds per head per day. When properly constructed it is tight and strong and of the correct size, shape and proportions to do the job for which it is intended. One farmer calls it his "Cattle Automat."

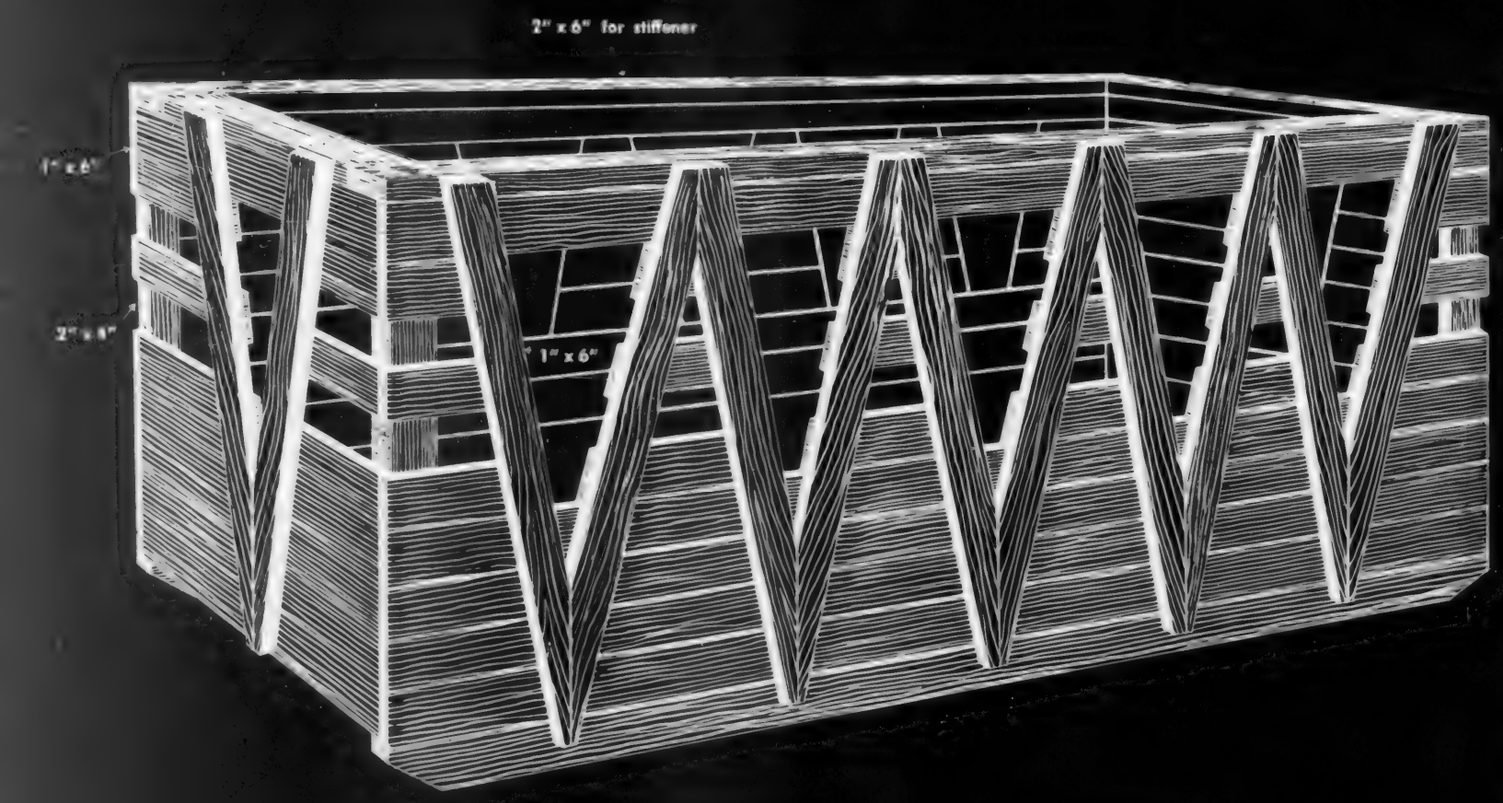
The V openings along the sides and ends handicap boss cattle which like to throw their weight around and play dog in the manger. The V opening is also a hay saver. While it permits the cattle to have easy access to the hay, the lower two feet of the rack are completely enclosed. This not only reduces the amount of hay pulled out on the ground but saves much of the leafy material which falls to the bottom.

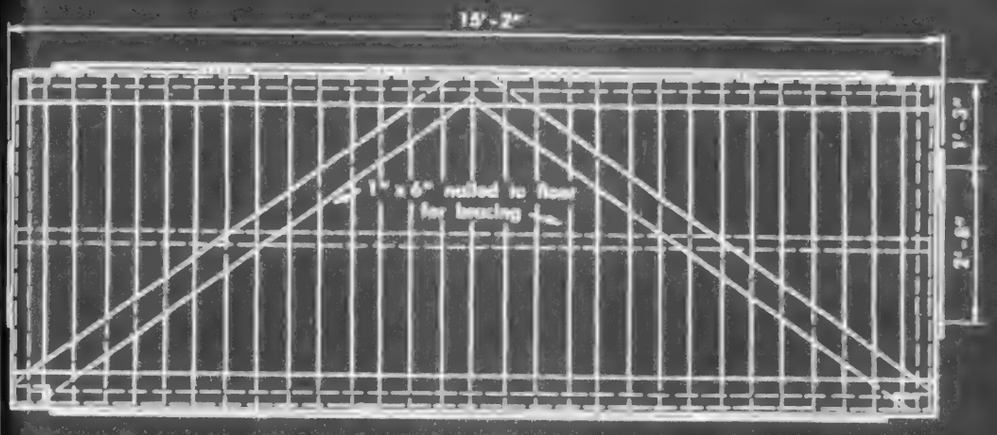
The three runners made of 2″x6″ material make it easy to hitch the tractor to the rack and skid it from field to field or to various spots in the same field. The use of pressure-treated material will add years to the life of the runners. A good, stout ring can be used as a hitch for pulling the rack or pieces of 1″x¼″ strap iron can be bolted to the ends of the runners.

The 1″x6″ diagonals nailed to the floor as illustrated in the floor drawing are an essential feature to assure the strength needed to withstand the stress and strains of towing over rough ground. Another item for reinforcement is the 2″x6″ stiffener spiked around the top of the rack.

The corner posts are 2x4's and the rest of the framing material, with the exception of the floor braces, is cut from 2″x6″ lumber. To insure the extreme in sturdy construction, some variations of this plan call for the use of 4x4's for the corner posts and 2x4's for the V frames.

While the Bill of Materials calls for only 8 and 16 penny nails, ½-inch bolts are recommended in joining the framing members.





FLOOR

BILL OF MATERIAL

Runners (pressure treated)

3—2"x6"x16'-0"

Framing Braces

2—2"x6"x16'-0"
1—2"x6"x10'-0"
2—2"x4"x10'-0"
2—1"x6"x10'-0"

Siding

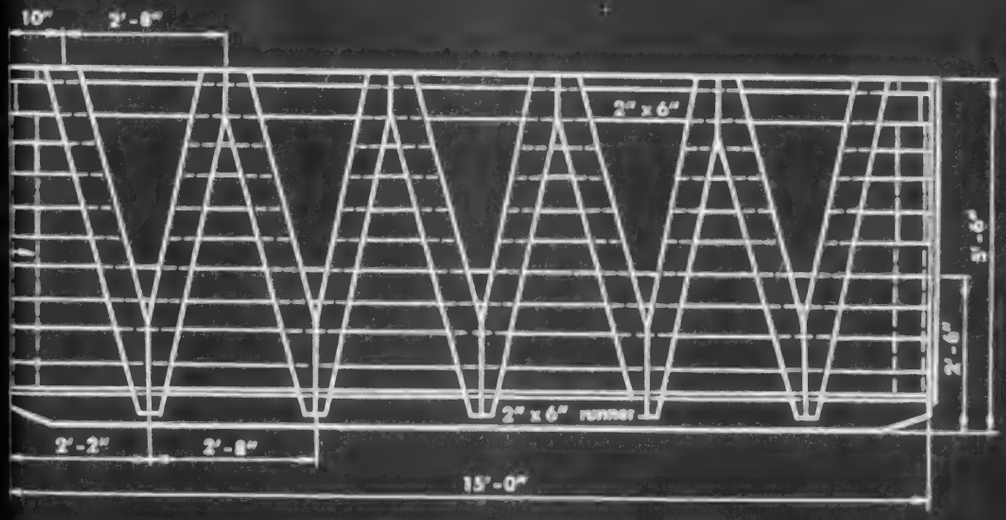
290 Lin. ft. 1"x6"
12—1"x6"x12'-0"

Flooring

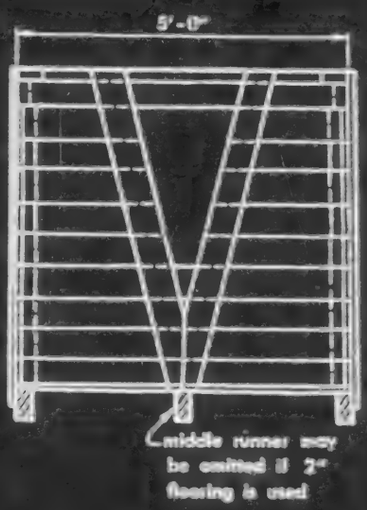
17—1"x6"x10'-0"

Nails

8 and 16 penny



SIDE VIEW



END VIEW

The two subsoilers (above) are mounted on a tool bar behind a D-4 Cat. The big hopper fertilizer attachment has been developed especially to eject fertilizer or lime through the hollow subsoilers when they are working at an 18 to 24 inch depth. Compressed air fed through copper tubes pushes the fertilizer out of the tools into the soil.

SUBSOILING

We are learning when and how to use the new tools that go deep into the subsoils

By Chester Charles

SINCE CIVIL WAR TIMES when the first subsoiler was patented, every farmer with a drainage problem has probably wondered if subsoiling might open his water-logged land and lead to bumper crops. If he has done much investigation he has heard of results ranging from the spectacularly successful to complete failure. If he has inquired further he has found that a large number of experiment stations claim it does no good while others recommend it. In some areas, it is a practice that is partly subsidized by the Agricultural Conservation Program to the tune of two to three dollars an acre.

When such confusion reigns we are prone to call the scientists fuzzy-headed dreamers who can't even agree on the value of a simple operation. I'm inclined to be more charitable. I've tried subsoiling on three fields with vastly different results. My experience has shown me that no sweeping recommendations can be made and that a lot more should be known about the practice. I do feel, however, that some solid facts can be plucked out of the confusion for the guidance of the farmer who asks, "Will it work on my farm?"

Talk to a dozen farmers or agricultural leaders and you'll get a half dozen meanings for the term, subsoiling. To clear the atmosphere, the most generally accepted meaning is this: subsoiling covers any disturbance of the soil below normal moldboard plow depth.

Let's get two items out of the picture: big plows and deep tillage. Both might be considered subsoiling. However, immense plows like the seven foot California giants invert the subsoil. Deep tillage, done by means of a cultivator-type implement, though reaching subsoil depths, is essentially a seed bed preparation designed to replace moldboard plowing and fitting.

In the manner I tried it, subsoiling has a more restricted meaning. It refers to the operation of breaking the subsoil at spacings of several feet or more and at depths of 16 to 30 or more inches by the use of a heavily constructed, rigid and pointed hook or boot-shaped tool which is pulled through the soil either as a wheeled and carrier-mounted or tractor-attached implement. The soil is not turned over. The purpose is to shatter hardened subsoil horizontally, with little loosening of the topsoil. Medium or large tractors are used. Power requirements depend on soil conditions and depth of penetration.

For use with rugged crawler tractors, tool bar subsoilers are available, permitting the employment of more than one rigid shank. Generally, two or three are used, at variable spacings. This is the operation usually called chiselling.

There are two more variations of subsoiling. Pan breaking is done by a cutter attachment on the bottom of a moldboard plow for the purpose of breaking up the floor of the plow furrow, generally 4 to 6 inches deeper than the plowshare. In *mole* drainage a torpedo-shaped wedge of metal several inches in diameter is linked to the bottom of a subsoiler tine so as to form a channel through which water can flow.

Trial and Error

My first attempt at subsoiling was on a flat field on the edge of a woods. The wooded area drains onto the flat field, carrying rain which percolates through the acid, hardwood leaf mulch of the forest floor. Topsoil in the field was only 4 or 5 inches deep, of low organic content. The main crop when I took over was poverty grass. Beneath the skimpy topsoil was a foot of thick hardpan, caused most likely by the high water table.

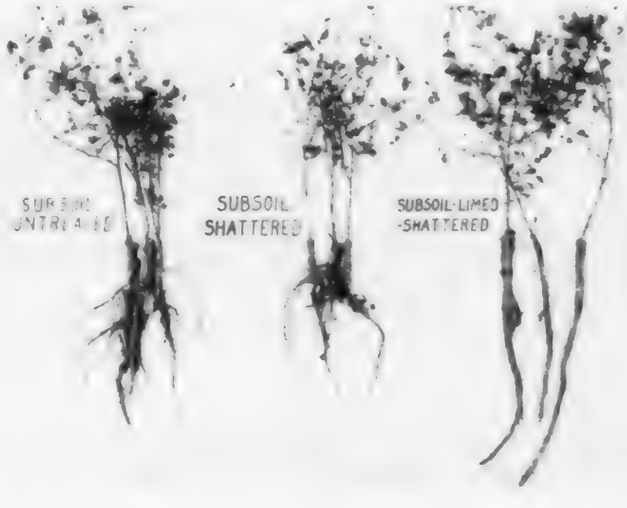
Prior to my ownership, the history of the field was so dismal that it should have been given back to any passing Indian to save taxes. In 25 years, the field had been cropped 3 times. A corn crop had been a complete failure. Of two soybean crops, one hardly paid expenses and a second, in a very dry year, was of fair yield, neighbors reported.

That first year, though our intention

(*Continued on page* 96)

The three-point hitch single subsoiler mounted on a Ferguson tractor (below) is being used for pasture renovation where a subsoiler usually works best, on a contour.

Sweet clover takes advantage of subsoiling and liming as the photograph (below) shows. This is the work of D. D. Smith at the McCredie, Missouri, Experiment Station.



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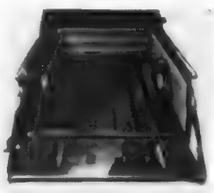
For instance, Ford now offers *eight* Short Stroke engines. Only Ford lets you choose from a full line of seven Short Stroke Y-8's and a Short Stroke Six, to suit power needs more exactly. Horsepower increases of up to 26% mean you get rolling faster, have

Only Ford gives you all these great truck features



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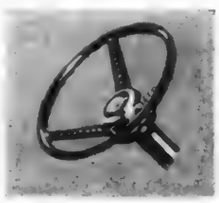
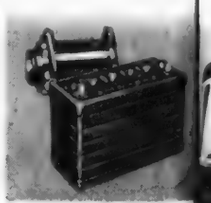


NEW! Deep-center Lifeguard steering wheel protects driver from steering column. Only Ford has it! Standard all models.

NEW! Lifeguard door latches give added protection against doors jarring open on impact. A Ford safety exclusive!



NEW! 12-volt electrical system for better starting, more reliable performance, greater electrical reserve.

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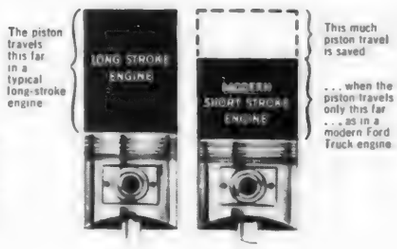
more reserve power, too. Result: more time saved, more work done.

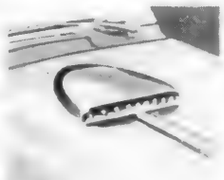
The built-in convenience of new DRIVERIZED Cabs with full-wrap windshields cuts driving strain, makes work easier. New *exclusive* safety features such as Lifeguard steering wheel and door latches, give you a measure of protection never before available in any truck.

New styling . . . for duty, as well as beauty, stamps Ford Trucks with a new eye-catching "look of leadership." The new Ford Trucks for '56 are on display at your Ford Dealer's now!

Less piston travel means less friction. Less friction means less wear . . . longer engine life, greater gas savings. Today's trend is to Short Stroke power. Only Ford, has had over four years and *five billion miles* of experience with Short Stroke.


The piston travels this far in a typical long-stroke engine
LONG STROKE ENGINE
MODERN SHORT STROKE ENGINE
This much piston travel is saved
. . . when the piston travels only this far . . . as in a modern Ford Truck engine

NEW! Full-wrap *rear* window for greater visibility, easier backing, parking, maneuvering. Available at slight extra cost. New wrap-around windshield standard on all Ford cabs.



NEW! Hood air scoop, 4-barrel carburetor, and dual exhaust system available on Series 750 and up, for extra reserve power!

NEW! Tubeless tires run 25° cooler, give extra mileage, resist blowouts! Standard on every Ford Truck model for '56.

NEW! *Master-Guide* Power Steering now available on most Cab Forward BIG JOBS, as well as most conventional BIG JOBS.

NEW! Sodium-cooled exhaust valves in heavy-duty engines operate up to 225° cooler, last far longer!

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TURKEYS, FISH AND WORMS

(*Continued from page* 63)

There was that strip of high mesa land for which he had never found a use. His farm lands lay below it, sloping down to the Mojave River bottoms. When soil experts made a favorable report on the water-holding properties of the mesa land, he hired bulldozers to gouge out three connecting reservoirs totaling 15 acres with a maximum depth of 12 feet.

By using his pump on irrigation during the days and turning the flow into the ponds at night, he kept his fields growing and a store of water increasing until he was able to fill his ditches directly from the reservoir headgates. Careful rationing permitted him to flood even the outermost fields and revive the high spots that had begun to turn yellow from the heat and drouth. The next winter's pumping filled the reservoirs and insured water for even more alfalfa and enough to begin to grow the wheat, oats, and barley he needed in his turkey feed.

The sight of these wide ponds in the middle of the grey, dry desert still gives Jess a great lift, though he soon recognized them as a personal threat. The water they held made it possible to irrigate more land and to raise bigger crops which took more work. This chain of events was bound to cut him out of his annual fishing trip to the San Bernardino Mountains which had always been the big summer event for him and his ranch hands. "It was a great morale builder—to me as well as to them," he explained, "and when we got too busy to even think of getting away for our binge, I just had to do something."

He promised his men he'd buy 2000 fingerling trout and plant them.

The 2000, however, grew to three times that number when he propositioned a fish breeder. Jess was skeptical that the natural feed in the reservoirs would support 6000 troutlings, but that was the smallest number the fishman would sell. In the deep, clear waters, his rainbows thrived amazingly, growing to 8 and 10 inches the first season. "There's your trout, fellows," he told them, "help yourselves."

They still do just that. Though much of the thrill of the San Bernardino outing has been lost in the shuffle, everyone admits that the new order of things nets more fish. To build up the picnic atmosphere, Jess installed tables and a barbecue by the shore of one of the ponds. Here a man can stand on the bank and literally flip his catch into the waiting frying pan.

As he feared, the fish soon exhausted the natural feeds in the ponds. They, like the turkeys and livestock on the ranch, became just so many more mouths that had to be fed. With what? Having a stock of turkey feed pellets on hand, he loaded a sack onto a boat. Sculling out from shore he proceeded to cast his bread upon the waters. The hungry rainbows soon learned to follow any boat on the ponds like sheep after a hay wagon in a hard winter.

This experiment led to a search for more economical fish foods. Dry feeds alone, the book told him, would not supply a balanced diet. They were lacking in the fresh protein and certain other values. Adding uncooked horse meat to fish menus was advised. But the cost of horse meat was too high and he settled for an inexpensive fish meal, a by-product of ocean fish canneries, which was high in protein and rich in minerals as well.

By delving into literature on commercial fish culture, Jess learned that trout assimilate only water soluble elements. Any raw oils or fats in their rations tend to pollute the waters without adding food values. He admits that his work with both turkeys and trout has made him something of a veterinarian. "Occasionally the trout in the ponds," he explained, "begin dying from causes unknown. Invariably I have been able to clear up the trouble by adding terramycin to their diet."

He is now feeding clabber beef blood protein with the fish meal base. The initial results have been favorable, but he states that his experiments must extend over a longer period of time before conclusive findings can be drawn.

By this time, his investment in fish-for-fun passed from the pastime stage into the commercial field. He was literally forced

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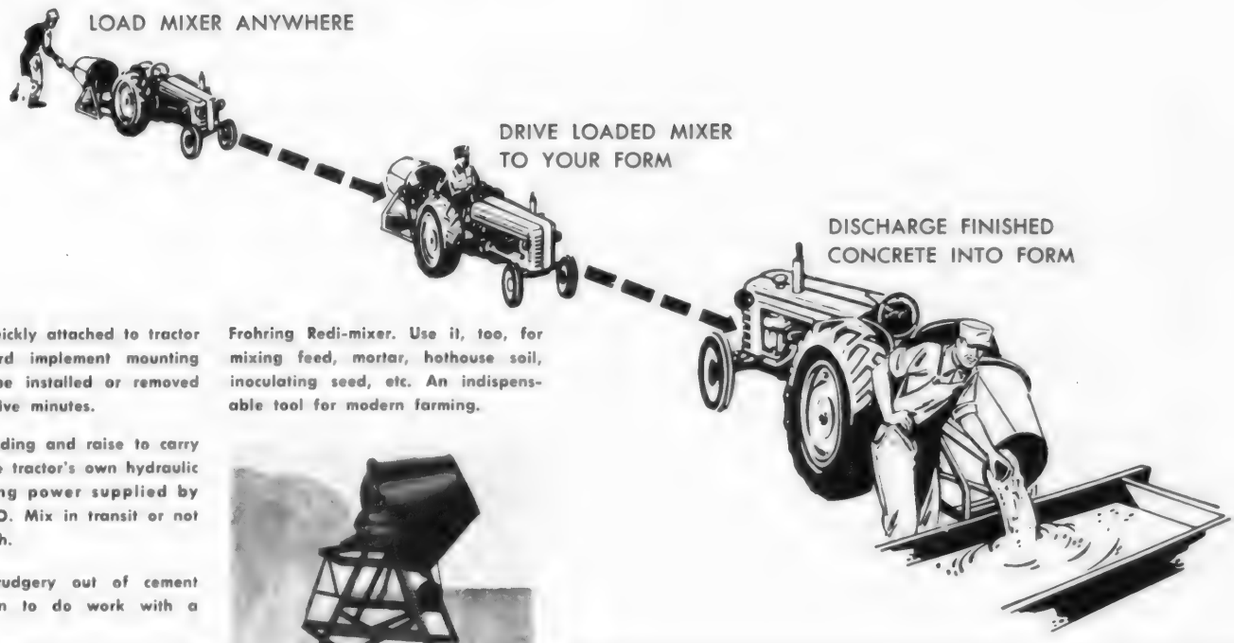

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Lower for loading and raise to carry —all with the tractor's own hydraulic power. Mixing power supplied by tractor P. T. O. Mix in transit or not —as you wish.

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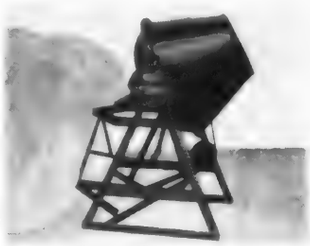

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into it because no amount of fishing that he or his help or his friends did could keep up with the growth of the inhabitants of his ponds. The market for fresh, frozen fish was just becoming established and Stoddard Jess has ridden it until he now packages, freezes and ships over 100,000 pounds of dressed fish a year. This, with an added 150,000 pounds of live fish sold, represents a total of 1,000,000 trout.

By turning over the processing of his fall turkey crop to a nearby commercial plant, he was able to convert his own turkey dressing and freezing building to handle his new fish business. Here, under amazingly clean and sanitary surroundings, the trout, taken from the ponds by traps, move swiftly from the cleaning rooms, through the packaging departments and into the quick-freeze plant on endless belts and conveyors.

Because trout do not reproduce in reservoirs, Jess finds it necessary to restock his ponds every year. But not at the original price of 12 cents a fingerling that he first had to pay. By building a hatchery and rearing ponds, he can now buy trout fish eggs for a quarter of a cent apiece. With his fish egg purchases topping 1,500,000 eggs, the hatchery soon paid for itself.

And Now—Enters the Worm!

On a farm where some 55,000 turkeys are raised, tremendous tonnages of refuse feed, pen cleanings, and manure accumulate. With ordinary farms, where field crops are grown and crop rotation is practiced, rough manures can be applied to lands that are to be plowed and enrich the soil. But in warm lands, favored by irrigation, alfalfa fields last for years before replowing is necessary. A deterrent from spreading poultry manure, feathers, and straw on semi-arid alfalfa land is that they contaminated the hay with disease, because they decompose so slowly. Decomposition under the dry, hot desert conditions is far slower than in the humid east.

After many years, these accumulations of turkey refuse became a serious problem. Valuable land was given over to constantly increasing heaps which rotted so slowly, that they had to be covered with new additions before nature could break them down into suitable fertilizing agents. Jess was torn between two evils, whether to commit the crime of burning this valuable fertilizer or continuing its disease-breeding potential near his turkey runs.

He found no answer until a salesman, Eric G. Sanders, came to the ranch offering a strange plan of salvation. Worms! Not just the ordinary backyard angleworm, but a specially developed master breed of soil improvers and refuse breaker-downers. Stoddard Jess was in a mood to try anything. He bought ten units of worm cultures, 1000 to the box, at $10 a box.

Under Mr. Sanders' direction, a scientific compost field was laid out on level ground with 8 foot beds on each side of

In the rumen of your cows, that's where — tiny little organisms by the millions.

It's a good thing, too, because animal nutrition experts have found these tiny "bugs" play a very important part in the production of milk.

These scientists have discovered that "if you feed the 'bugs' along with the cow" *milk output increases!*

That's exactly what the new TUXEDO DAIRY with Vita Rumen added is designed to do— *does* do for dairymen all over . . . and it'll do it for *you*, too!

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Chops all crops... from shortest to tallest!

Some chop the short, some chop the tall—but a Gehl *chops all!* That's how this famous "Chop-All" Mower Bar and cutting mechanism *earned its name and proved its fame* — harvesting all crops—from 12 inches to 12 feet!

Send for facts proving how a GEHL can harvest *all* your forage crops with less work—and at the *lowest cost per ton.* Buy Gehl — *always more chopper per dollar!*

Gehl "Chop-All" almost hidden by that giant wall of sorghum.

5 or 6-Foot Mower Bar—Hay Pick-up—1-Row and Low Cost 2-Row—each with "QUICK-SWITCH."

More farmers own Gehl Choppers than any other independent make.

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Dept. MM-592, West Bend, Wis.

CHECK

Please show me how I can chop all crops with a GEHL "CHOP-ALL"..... ☐

Send me your Grass Silage Book..... ☐

Print Name.....

Address.....

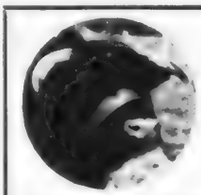
State.....Acres farmed.....

a series of 10 foot roadways. The pen cleanings were spread out daily two to three inches deep on the beds and kept moist with rotating water spray. The cultures were planted in the beds at one end of the field. These cultures quickly grew into mature worms and went to work breaking down the compost into castings rich in nitrogen, phosphates and potash.

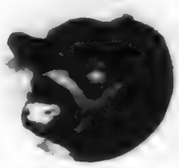
The castings, which Jess figured would be the end point of his worm project, constitute an ideal fertilizer. Here was the answer to a dream of all agriculturists; a fertilizer without coarseness and so readily available to crops that it could be applied directly to alfalfa fields. To speed the project, he ordered another and much larger shipment of the worm cultures.

Then as he watched developments, he discovered a bonus angle. His worms had itchy feet or bellies. As soon as the end beds were reduced to fertilizer, the adults migrated to adjoining beds—fresh pastures—leaving behind millions of eggs and small worms to carry on. These young could also be transplanted to new beds to speed up the process. The purchase of additional worm cultures became unnecessary.

Then his worms began to multiply beyond all expectations. Their rate of begetting is something astounding. A forkful of compost practically squirms. Each worm, being both male and female, can fertilize its own eggs; each worm is cap-



WANT GREATER BEEF CATTLE PROFIT?



Here is what a SHORTHORN or POLLED SHORTHORN bull can do to increase beef herd efficiency:

***increase* weaning weights 50 to 100 pounds . . . *increase* calf crops 10 to 15 per cent . . . *increase* yearling weights 100 to 200 pounds . . . *increase* mature cow weights 100 to 200 pounds . . . *increase* grazing efficiency and traveling ability . . . *increase* milk in replacement cows . . . *increase* resistance to heat, cold, pink-eye, cancer eye and other infections . . . *increase* carcass value . . . and finally, *increase* market returns by bringing higher prices for weight.**

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A complete line of hand broadcast seed sowers.

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Power Seed Sower and Fertilizer Distributor

Fits all Tractors

Front or rear mount—P.T.O. or motor models for front or rear drive. Sows all smooth grass seed, grain, granular or pellet fertilizer. Ideal for cover crops. Hours of time saved. 1 and 3 bushel sizes. Extension hopper available for increased capacity. Easy to mount and operate. Send for free literature and informative grass land booklet.

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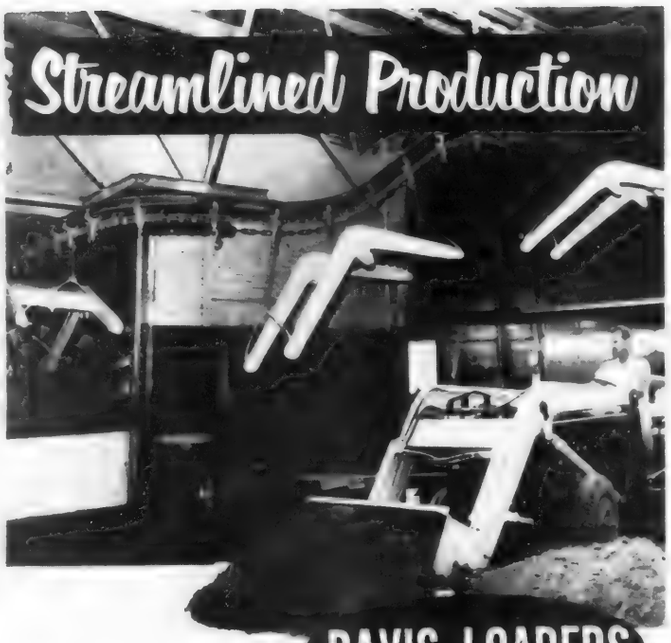

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PERFORMANCE • QUALITY • PRICE

Sure, the Davis Loader gives you more for your money...and streamlined production is the reason! It takes new, modern methods to manufacture America's quality loader at a price that's competitive. But, that's the reason that your Davis Loader is always dependable. Precision tooling produces uniform quality from the first to the last and it gives the Davis Loader its streamlined design. Strength is "built in" so that no encumbering braces block your vision or hamper the maneuverability and versatility. Yes, the streamlined production of the Davis Loader pays off when it's attached to your favorite tractor...because it will handle dozens of hard jobs in record-breaking time. Many versatile attachments available.

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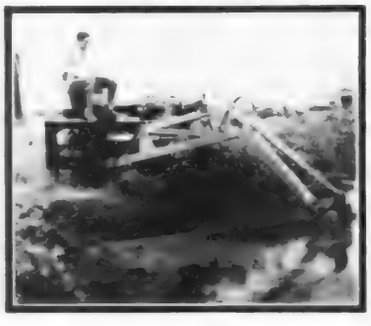
THE NEW 1956 DAVIS BACK-HOE DIGS AT RIGHT ANGLES



...and it makes a thoroughbred combination with the Davis Loader.

1. Operator revolves with boom...faces direction he is working.
2. Extra wide frame...individually controlled hydraulic stabilizer feet.
3. Detached or attached to tractor in 5 minutes. New 1956 Model 102 Loader is equipped with mounting bracket for back-hoe.)
4. Digs 13 feet deep.
5. Priced less than you think.

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Please send me literature and name of dealer on the Davis Loader_____Davis Back-hoe_____ to fit a_____tractor.

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able of breeding with its neighbor. Jess made some rough calculations and figured that the worms were increasing at the rate of around a million a day. Further multiplication showed that a million worms weigh 2,000 pounds.

Here was the real bonus. A ton a day of time-tested, high protein trout food to take the place of the commercial feed that was costing him $300 a ton delivered.

But how to harvest this crop? In his work shop, a weird Rube Goldberg machine is being constructed to separate the worms from the compost and guide them into boxes to be hauled to the reservoirs.

Just to make the circle absolutely complete, if not replete, the fish entrails and refuse from the packing operation are dumped on the compost heap where they are run through the eager gizzards of the worms. So the worms that feed the fish are fed by the fish to feed more fish.

This, according to Jess, is the end of the circle. "My wife says she'll leave me the minute I start another project," he said. Friends have their doubts. Out back, they notice, there is an experimental field of sunflowers fertilized with turkey compost and watered with fish water. It wouldn't startle them to find Jess trying to start a new Landon campaign or perhaps importing Russians to eat the seeds.

THE AUTHOR: C. W. McCullough gained his first farm experience as a kid on an Idaho wheat homestead. After graduating from agricultural college, he was, in turn, wool grader, sheepman and dairy farmer, his stomping grounds ranging through Wyoming, Idaho, Nevada, Montana and Utah. He went from grass root farming to underground mining and after twenty years in the mines, he is now Safety Director for a Park City, Utah, mining concern. This varied background has supplied him with a wide range of subjects to write about, such as the Stoddard Jess story.

LAND SMOOTHING

(*Continued from page* 66)

we can get out and get the plowing done early. In the summer we need it for getting our irrigation water spread effectively over the fields. And because of getting an early start in the spring and keeping the crop growing with irrigation we can get our cotton well along by early August and beat the boll weevil. You see we have a boll weevil migration each year that comes within a day or two of August 10th. If we can get the squares, that's the cotton bolls, out of the blossom stage and set by that date, we are pretty safe. The boll weevil is at the adult stage and he likes to leave the older cotton in the bottom land and go to the tender plants on the irrigated fields. Two or three weeks advance in cotton maturity can pay off double. We've found our leveling program can make the difference between ¾ of a bale an acre and 1¼ to 1½ bales.'"

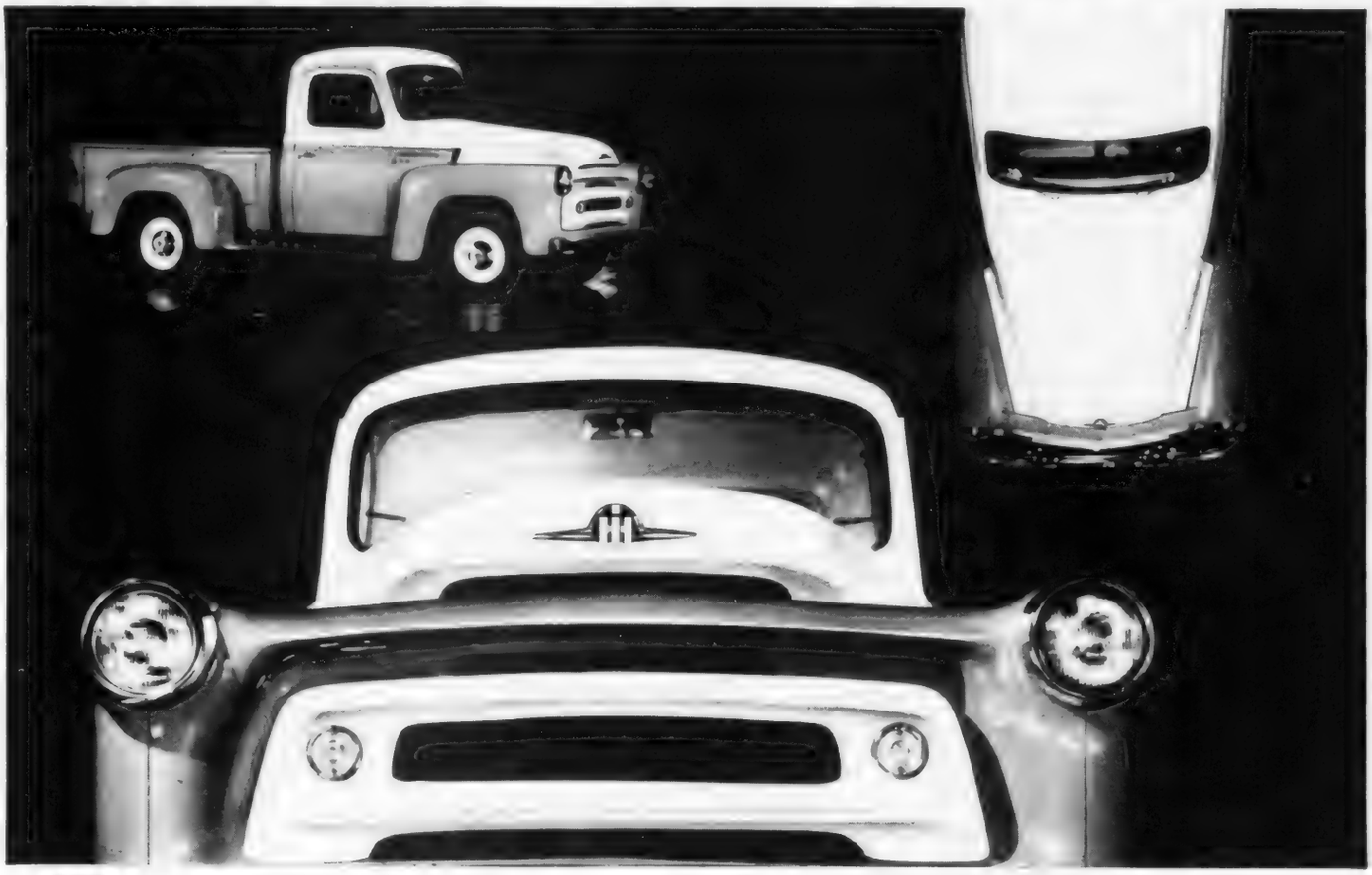
Mack will tell you that when he first talked about the land leveling program with Lyle Bobeck, the Jackson County SCS Work Unit Conservationist, in 1953, he was convinced it would be the answer to his timing problems.

"It isn't that we don't have plenty of rainfall here: we just don't get it spaced right," says Mack. "Those long waits in the spring when we used to mire down equipment in the wet spots have always kept us from getting crops started when they should be. Now, on our graded land we can get onto the fields 2 to 3 weeks earlier. We've got the irrigation water, and we wanted to be able to put it on the cotton and soy beans if we had a dry spell at a critical period in the crop growth. Control over the farming schedule in those periods alone makes the whole leveling program worthwhile. But we didn't jump right into the leveling program. I wanted to get together some cost estimates and do the planning with SCS people first. Lyle Bobeck and his SCS men made detail plans for leveling this 110-acre field. This included engineering surveys, working plans, necessary cut and fill stakes and checking the work as it went along."

Mack bought two new pieces of equipment, an Engler hydraulic wheel scoop and an Eversman 40-foot leveler. Before any leveling equipment was used Mack had a man on a Farmall M pulling a big tandem disc, work over the 110 acre field for 5 days, in a criss-cross pattern to loosen up the ground. Then he used an Engler scoop to make the cuts and fills; this took

new style! new comfort! new power!

new Internationals!



New INTERNATIONAL "S-line" includes light, medium and heavy-duty models from 4,200 to 33,000 pounds GVW, with 10 gasoline and LPG engines, every modern truck feature.

Functionally styled for practical good looks!

Here are the new INTERNATIONALS . . . a great new truck line from *any* point of view! Their clean-lined styling is trim and functional—designed to take the rough going of farm truck work without excessive repair costs.

Driver designed for real comfort!

And they give real comfort, too! They're driver-designed to let you work longer without fatigue. Loaded with performance and handling features that make every hauling job easier.

More usable horsepower for BIG money savings!

These great INTERNATIONAL trucks offer more horsepower—develop their power for sustained operation at lower, more economical engine speeds. They're *all truck* with no passenger car engines or components asked to do a truck job. That saves you the BIG money—the over-the-years operating and maintenance money. Drive them today, at your INTERNATIONAL Dealer or Branch.

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INTERNATIONAL® TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Industrial Power
McCormick® Farm Equipment and Farmall® Tractors

soil conservation costs hit a new low!

THIS TUMACO EQUIPMENT BUILDS TERRACES FOR ABOUT 1¼¢ A FOOT...

does virtually any soil moving job.

levels, fills gulleys, digs ponds, builds waterways, diversions and drainage ditches.

Yes, Tumaco builds terraces for 1¼¢ a foot—and this includes operator's time, fuel oil, grease, interest on investment, depreciation and cost of repairs and maintenance.

Compare this 1¼¢ with 3¢ to 6¢ a foot—the national average cost for terracing and it's easy to see Tumaco pays its own way, wherever there is conservation work to do.

Even if your terracing needs are small, you can join with your neighbors in making this equipment investment—or do contract work for the farms in your area. It's a money making proposition any way you figure, because Tumaco offers complete soil moving services at an outstanding low cost.

Before you buy any soil moving equipment, or BEFORE YOU CONTRACT for the work, get the complete information about the new Tumaco.

INCLUDES TERRACER, SCOOP and ANGLE DOZER

•

FAST, TIME-SAVING Handles the dirt only once.

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EASILY ATTACHED or REMOVED from tractor at any time.

Tumaco Equipment

● **WRITE TODAY** for complete information about TUMACO EQUIPMENT and name of nearest dealer.

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. . . on the job year after year . . .

CONTINENTAL RED SEAL POWER

The year-in-year-out dependability of Continental Red Seal® engines is one big reason why you find so many Continental-powered machines in service on American farms. Thousands of owners have found that these truly specialized power plants operate season after season with only routine maintenance, not only speeding work, but minimizing dependence on weather and uncertainties of help. Continental is the preferred power with leading makes of farm machinery, because it is truly FARM power, engineered with the exacting requirements of agricultural equipment in mind . . . Red Seals are built to operate under the least favorable conditions, with the least attention, and the least time out . . . And they're backed by parts and service facilities coast to coast.

Continental Motors Corporation

MUSKEGON, MICHIGAN

him 36 days more. One man handled this from a John Deere RD tractor. The maximum cut was one foot, but the average cut and fill was 3/10th of a foot. Nine days' work with the Eversman leveler pulled by the Farmall M did the smoothing. Mack's per acre cost for labor, fuel and repairs for this 110 acre field was $11.65 without any depreciation allowance on the equipment.

"Leveling is one of the really big advances in our farming," says Mack. "We are going right ahead each year with leveling the other fields as we can get to them."

E. A. McRae, Engineering Specialist for the SCS in Arkansas, has these points to make on "land grading," as he prefers to call it:

"(1) Get help from your SCS office, or your extension engineer. It may be that with a leveler or wheel grader you can do enough work knocking off the high spots and filling in the low places to serve your purpose. We don't try to make a field *level*. We *grade* it so high and low spots are not extreme.

(2) If you expect to go into surface irrigation, you will want a contour map of the field prepared. Such a map usually, made with an 0.2-foot vertical interval, is used by the Soil Conservation service in preparing detailed plans. The work plans should be studied carefully in relation to grade stakes before the moving of earth is begun. They will most likely be set every 100 feet in each direction. Your engineer will give you a stake that is the average grade, probably near the center of the field. The other stakes will have the amount of cut or fill marked on them. To keep the amount of yardage moved low, we like to keep the grade 1/10, 2/10, or 3/10 of a foot fall in each 100 feet, the nearer to the 1/10 of a foot grade the better. This will control erosion, insure more uniform moisture application and provide satisfactory drainage.

(3) You can work the fall *two* ways on most fields to keep the yardage to be moved low. We find the average grading job in Arkansas requires 150 cubic yards of earth moved per acre. Contractor's prices for this—15 cents a yard—will bring the cost for leveling to about $22.50 an acre."

Custom Reforesting

Reforest your idle acres for Christmas tree profits, soil conservation, and wildlife restoration.

Our mechanical planters plant seedlings at the rate of 1000 per hour in unprepared ground.

Write for details

FARMLAND IMPROVEMENT CO., INC.

MAIN & WESTERN YORKVILLE, ILL.

HAMILTON, OHIO

Manufacturers of the Farmland Multiplanters

How to Start

If you have a field on your farm that is too wet to work until too late in the spring, you may need land smoothing with its planned run-off ditches. Or if you want to do leveling before you go into irrigation, you have a good reason for looking into the ways to get the job done. But, in any case, a good starting point is with your local extension service specialist or with the Soil Conservation Service engineer. A few hours spent walking over the field with a level and target rod can save considerable time later. Farmers who work once with an engineer on a field smoothing job often get the hang of it well enough to buy a small level and target like those made for farm use by Bostrom-Brady Mfg. Co. of Atlanta, Georgia, and do their own grade layouts. Extensive leveling ordinarily requires the services of a trained engineer to plan the system.

The Extension Service and Soil Conservation Service can also help with the details of financing when you decide to go ahead with the work. Land smoothing for drainage, as well as for irrigation, can be financed under the Soil and Water Loan Program of the Farmers Home Administration.

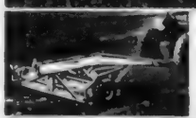
What Kind of Machinery?

Practically any kind of tool, from a shovel to a giant earthmover, can be used for

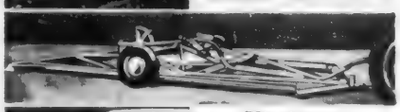
Eliminate DEAD FURROWS and BACK FURROWS—Make a Better Seed Bed

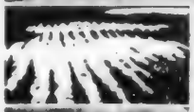
Eversman's All Purpose Tillage Tool and LAND SMOOTHER

Make plans now to smooth fields, fill pot holes, improve surface drainage with an Eversman. Eversman smoothed fields free of pockets, dead furrows and back furrows greatly increase crop yields—reduce labor and water costs on irrigated land. With springtooth attachment the Eversman is a complete TILLAGE TOOL, which breaks clods, mulches the soil, makes a firm, well packed seedbed which holds moisture, makes planting uniform, cultivating easier and harvesting faster.



Six all-purpose models for all standard farm tractors...for AUTOMATIC SOIL SMOOTHING, DIRT MOVING, SEEDBED PREPARATION!





Eliminate Pot Holes

With an Eversman and your own tractor it is easy and inexpensive to eliminate pot holes, fill gullies, straighten out terraces on hillsides, build farm over drainage ditches and grass waterways. Write for useful FREE booklet.

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LILLISTON ROTO-SPEED ROTARY CUTTER

A MODEL FOR EVERY FARM

SHREDS STALKS
CUTS STUBBLE
MOWS PASTURES
CLEARS LAND

All year round the Roto-Speed works all over your farm—mowing, shredding, clearing and cleaning up. Massive blades do the job—blades that power their way through the tallest grass, the thickest stalks, the densest brush. Kills insect breeding places, too. The Roto-Speed's an all-around cutter that will do an all-around job on your farm. See for yourself. Your dealer will be glad to give you a demonstration.

THE ROTO-SPEED LEAVES MULCH THAT HELPS CONDITION YOUR SOIL. NOW'S THE TIME TO PREPARE FOR SPRING!

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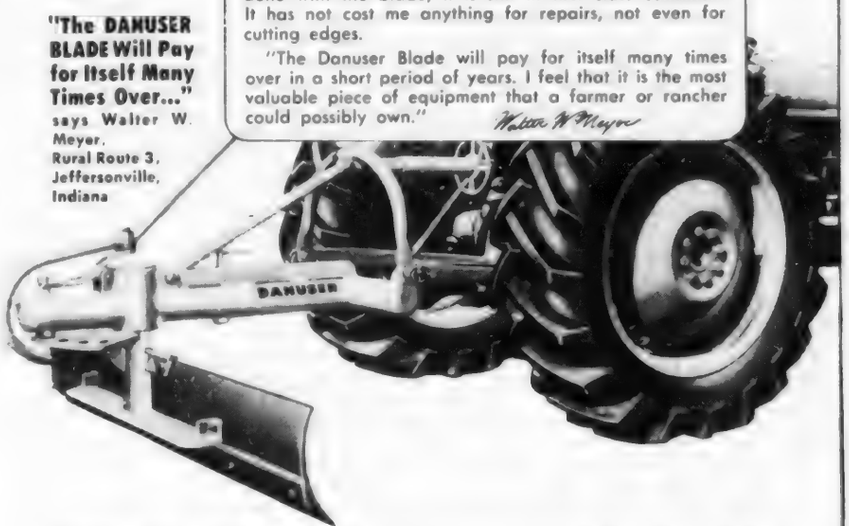
"The DANUSER BLADE Will Pay for Itself Many Times Over..." says Walter W. Meyer. Rural Route 3, Jeffersonville, Indiana

"This machine is ideal for field leveling, grading yards, and constructing firebreaks. It is also an excellent tool for keeping fence rows clean, and backfilling after tiling a field.

"I am in the contracting and road building business, and I do custom work for neighbors, so my blade is constantly in use. In spite of the amount of work I have done with the blade, it is still in first class condition. It has not cost me anything for repairs, not even for cutting edges.

"The Danuser Blade will pay for itself many times over in a short period of years. I feel that it is the most valuable piece of equipment that a farmer or rancher could possibly own." Walter W. Meyer



LIKE MR. MEYER, YOU CAN "MAKE THE GRADE WITH THE DANUSER BLADE" TO SAVE TIME, LABOR, AND MONEY. Write today for literature pertaining to your model tractor.

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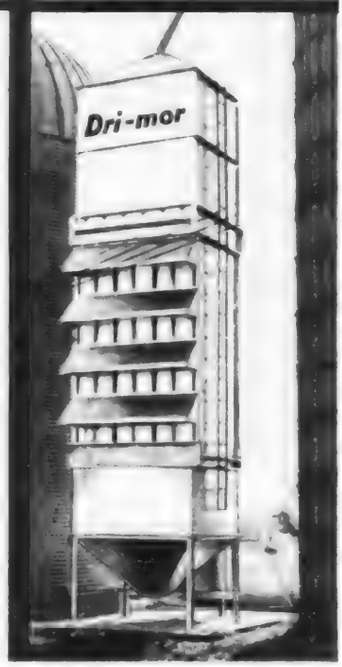
"Contributing to Farm Mechanization"

how

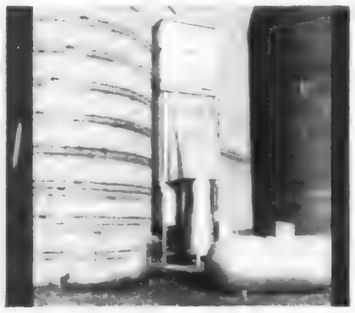
many acres

should you have in grain to make a farm drier pay off?



The advantages of on-your-farm drying are many fold . . . you require less storage space, you harvest earlier for greater yield, with less chance for weather damage . . . you get your crop into the market sooner when prices are better, you get more money for pre-dried grain . . . these and many other reasons make farm drying a big profit maker. Two big questions remain: how big should your operation be before a farm drier will pay off . . . and what drier should you buy?

Our newest brochure on the Finco DRI-MOR will give you a lot of valuable information on both of these questions. It is yours for the asking. If you are a producer of corn, sorghum, oats, wheat, barley, or rice, write for this free booklet.



The DRI-MOR is the most advanced batch-type farm grain drier on the market today . . . embodying many exclusive features:

Faster drying
No downtime for loading or unloading
Reduced operating costs
Improved grain quality
Greater capacity
Less maintenance

all pointed toward improving your operations and increasing your profit.

Send for your free brochure. No obligation!

Finco, Inc., Aurora 3, Ill.

Please send me your new brochure on the profit-making DRI-MOR, together with information on my specific operation.

	Corn	Sorghum	Wheat	Oats	Barley	Rice
I plant (check)						
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I feed (check)						
I sell (check)						

Name _____

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(Route) (Post Office) (Township)

DRI-MOR *sold exclusively by Finco, Inc.*
Manufactured by Pierson-Moore Co., Lexington, Ky.

land smoothing. There are scrapers that hook onto all of the three-point hitch tractors that can do a grading job and the scoops that are mounted on the back of tractors will move the earth from the high spots to the pot holes. Wheel scrapers are useful for moving major cuts and fills and for hauling dirt for long distances. They are also used for cutting drainage ditches. Road graders will do a good ditch-making job. To do the final smoothing job you need a "long wheelbase" land plane. Among the firms making these are: Atlas Scraper and Engineering Co., Bell, Calif.; Armour Farm Implement Co., Vancouver, Wash.; Be-Ge Mfg. Co., Gilroy, Calif.; Eversman Mfg. Co., Denver, Colo.; Gurries Mfg. Co., San Jose, Calif.; Hancock Mfg. Co., Lubbock, Texas; John Deere Co., Los Angeles, Calif.; Marvin Landplane Co., Woodland, Calif.; Soil Mover Co., Columbus, Nebr.; Speedline Mfg. Co., Las Cruces, N. M.

The longer the wheelbase of the land plane, the more accurate your finished grade will be and the quicker the job is done. If you have ever fitted a door into a door frame, you'll remember that you can do the job with a 5-inch hand plane, but to get a fast job with no hills or valleys, you need an 18 or 24-inch carpenter's plane. The same principle works with land leveling. However, an accurate finished grade can be made with the smaller machines, and since they are cheaper most farmers use them.

Custom Land Graders

Contract land graders are working in many parts of the country; and hiring a custom man gives the farmer a chance to try out land leveling and get the work done with adequate equipment, without investing in it. Garner Morrisett, of Marked Tree, Arkansas, is a farmer who bought an Engler wheel scraper in 1954 to do his own work. Before he had finished his first 40 acres, he had neighbors asking him to do some grading on their land. That's how he got in the custom business. By the season's end he had three scrapers and an Eversman leveler operating on a contract basis. This year he expanded, and still had more work than he could do. Morrisett does his grading after the farmer has disced his own land. For a tractor, an operator, and a scraper or leveler, he charges $5 an hour.

Morrisett saw the most spectacular results of his 1954 grading on a 60 acre wheat field that was harvested in 1955. Mack Howington of Marked Tree had fertilized this 60 acres for five years and planted wheat. Each spring the wet weather drowned it out. But the big change came when the spring downpours let loose in 1955. Each time the water drained off in time to keep the wheat growing. At harvest time, the wheat was standing with heavy heads and the combine counter showed it averaged out 35 bushels to the acre.

Pot Holes Get Worse

Low spots have a habit of getting lower, unlike the high spots in a field, which in time do wear down. Since a pot hole usually stays wet and soggy for a couple of weeks longer than anywhere else in the field, the tractor tires pick up the mud as it is driven through and drop it off around the dry edges, gradually making a ridge around the hole. Then, too, the packing action is greater when the ground is wet and the rubber tires push the hole deeper, and make it harder for the water to percolate down into the subsoil. When water can't get down, it spreads out, and soon the pot hole has doubled its original size. Land smoothing can cure this condition by building a level grade over which the water (and the tractors) pass uniformly.

Loans for Leveling

Clinton Bowling, the Poinsett County, Arkansas, SCS Conservationist, points out that with loans available from the FHA to finance land grading, his district members are finding it is a farm improvement that pays its own way with increased yields.

Says Bowling: "Our people can get a loan for the full amount of the grading on a 1 to 20 year loan at 4½ per cent interest under the S and W Program (Soil and Water Conservation Loan Program). This year they can get a $5 an acre credit on their loan as soon as the grading is completed and it meets

An insulated interior lining makes the 40 x 20 shop end of the Borcherding Quonset 40 x 80 a comfortable place to work both in winter and summer.

"You might call us a 'Quonset family,'" says Hugo Medow, Seward, Neb. "I liked my machine shed so well that I have since got another Quonset 32 x 60 building that I use as a cattle barn."

"My Quonset 24 x 72 machinery storage building gives me plenty of headroom and floorspace at a price I can afford to pay," says F. Gordon Stockin, Chaffee, N.Y.

This is the shop section of the Quonset 24 x 84 which serves as a machine and tool shelter, pump house, and farm shop for P. H. Hanes, Jr., Clemmons, N.C.

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For instance: The Digest predicted hog prices would hold in the 18-20¢ range during the 1954-55 fall and winter months. Some services predicted a break in hog prices to a 15¢ level in the fall. The Digest said prices would be lower in February. Others thought the February market would be better than December. Clients who followed Digest advice were hundreds or thousands of dollars ahead by planning their feeding and marketing according to Digest analysis and forecasts.

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the ACP specifications. Next year, the ACP (Agriculture Conservation Program) will pay 8 cents a cubic yard and up to a maximum of $25 an acre for yardage moved in land grading, if over 100 cubic yards is moved per acre. Our Soil Conservation District, like many others throughout the country, has grading and leveling equipment available which can be rented for a reasonable figure. A small wheel scraper costs $1.25 an hour for the actual time it is working. One helpful dividend we're getting from land smoothing in our heavy soil is that a farmer can get into a row crop with a cultivator 3 or 4 days sooner after a heavy rain. This is soon enough to prevent weed growth that might cut the yield by 10 or 20 per cent."

Land smoothing has turned out to be something of a "sleeper" in farm methods. In wet years it does its job as a drainage worker. In dry years it can be counted on to hold moisture longer than a rough field. And if irrigation, either surface or sprinkler, is used, it wrings the moisture out of every drop by spreading the water evenly over the land.

TOM LASATER MADE HIS OWN BREED

(*Continued from page* 32)

of all colors whose Brahman ancestry is immediately apparent in their hump, dewlap and sheath.

The most unique thing about the Beefmasters is that they are a recognized breed without herdbook or registry association. Tom Lasater cannot produce a pedigree or registration certificate for any individual in his entire herd. As a matter of fact, he can't even identify the sire of any of his animals since everything is range bred and there are no single sire herds on the ranch. That is all part of the Lasater philosophy of cattle breeding.

The Goal

The goal Lasater set for the Beefmaster is efficient beef production. That's all. He doesn't give a hoot how pretty or how ugly his cattle look just so they produce beef. Individual pedigrees, says he, are for the birds—the vultures. They don't mean a thing. It's the total pedigree that counts; the herd in which every individual comes from stock with identical performance records. "Ninety-nine out of ninety-nine cowboys (cowboy is Lasater language for anyone in the cattle business) will always want to see the sire and dam of a bull calf before they buy it," he says. "That's the worst thing they could do. That calf has got to stand on his own feet. His sire will represent only a small percent of the bull calf's calf crop and the same with his dam. Individual pedigrees are nothing because the blood washes out so fast."

Then he'll go on to point out the economics of breeding big, useful cattle: "The average cattleman," he says, "is overly influenced by selling price per pound. Actually it is price times weight times the size of the calf crop that gets the job done. Likewise, to produce weight it takes more than just depth of body or width of body. It takes depth times width times length times density.

"It is the weaning weight and the size of the calf crop per one hundred cows which are the key factors in the cattle business. In any given operation, if the annual cost of carrying a cow is eighty dollars, if the net weaned calf crop averages eighty per cent and the weaning weights average four hundred pounds, it follows that the cost of calf production will be twenty-five cents per pound.

"If this calf crop can be boosted to ninety per cent and the weaning weights to five hundred pounds, the calf production cost would be lowered to less than eighteen cents per pound.

"For the past five years we have averaged a net, weaned calf crop from all cows, including two year olds, of eighty-five per cent here at Matheson and eighty-nine per cent at Falfurrias. Both ranches have been through the worst drouth in history during this period and under these rough range conditions our

calves will average six hundred pounds or better at eight months of age."

The man isn't exaggerating when he talks about the 600 pound weaning weights. That's exactly what his bull calves weighed at weaning Dec. 1, last year, at an average age of seven months. On July 1 of this drouth year, they averaged 994 pounds. Their only feed was two pounds of dehydrated alfalfa pellets a day from Dec. 15 to March 25 and six pounds of a grain protein pellet. During storms when they were unable to forage for themselves they were given some hay.

Lasater's all-time record on weaning weights was in the fall of 1948 when a three year old cow in a demonstration herd he had at Mason, Texas, turned off a 906-pound bull calf. The calf appropriately enough, was named Don Elefante. The 17 bull calves from that particular demonstration herd averaged 668 pounds at eight months and the 27 heifers hit 563 pounds. None of these calves received any supplemental feed. The only winter feed their dams received was 2¾ pounds per day of 32 per cent protein range cubes for 70 days.

The Method

The program which produces this kind of cattle Lasater calls the caldron system of breeding, or the anti-pet system. And he guarantees that any breeder who has the courage and tenacity to follow it can have the herd of his dream in three generations of cattle, six years if he breeds his heifers as yearlings.

He makes no qualifications as to breed either. "Forget you ever heard of Beefmasters," he says, "you can do this with any breed you choose. You start by getting a bull from any ranch you want—say X Ranch. Look around, find the man who is turning out the kind of cattle you like, then get a bull from him. The important thing is in selecting the type of cattle that meets your standards regardless of the breed.

"Breed this bull to your cows—and again it makes no difference what breed they are, whether they are the same breed as the bull or not. Weigh and select the top heifers from these matings and breed them back to another bull from X Ranch. Select the top heifers again and repeat the process. After three crosses like this your herd will carry seven-eighths of the blood of the X Ranch and you will have your dream cattle. The judgment you have exercised in your culling and selecting will be much more important than the influence of the one-eighth original blood."

The system demands courage and tenacity. The caldron system is a very apt name. Lasater literally boils the culls out of his herd. He works with masses of genes, continually stirring the pot, selecting from the top those animals which meet his standards and ruthlessly culling everything else.

That's where the anti-pet idea comes in. There are no pets on the Lasater Ranch. Each individual must stand on its own feet. It gets no credit for being by an outstanding sire or out of an outstanding dam. The heifers are bred to calve at two. If they fail to drop and wean an early calf that year, or any subsequent year, out they go, with no exceptions.

"Any breeder who gives his cows a second chance just doesn't give himself an even break," is Lasater's way of looking at it. "True, we occasionally lose a good one this way," he says, "but we do get rid of *all* the lemons. You're not going to hurt yourself if you lose an outstanding one now and then so long as you keep the *average* of your herd at a high level; but you can't afford to keep lemons."

All of which leads to another Lasater maxim: "No man can make any real progress in livestock breeding with high-priced stock. He just won't have the courage to knock a ten or twenty thousand dollar lemon in the head."

In Lasater's book there are no secrets, no mysticism in sound, progressive livestock breeding. The key is to limit your goal and keep your standards simple. If you want to breed beef, select for beef characteristics and nothing else.

"If you want to breed long-tailed cattle, that's easy enough," he says. "If you want red colored cattle, that's easy too. But if you want long-tailed, red cattle that will make beef, too, you're

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J. R. FRANK, LOUDONVILLE, OHIO

MR. FRANK is completely right in calling the Doane Agricultural Digest a "piece of equipment." Properly used . . . and it's easy . . . the Digest is the lowest-cost farm-profit tool you can own.

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complicating the issue and it can't be done."

So to breed beef Tom Lasater has set up a six-point standard. He selects his cattle on the basis of disposition, fertility, weight, conformation, hardiness and milk production. No numerical value is placed on any of these standards. They are blended and when any one of them gets very far out of line it automatically becomes 100 per cent. For example, should a cow be just about perfect on the first five points but a poor milker, her days are numbered.

The Lasater Beefmasters have a disposition that seems to be the result of an outcross with a St. Bernard dog. Actually, that is how docile they are. Lasater attributes this to their Brahman blood. Docility, he contends, is an indication of intelligence, and Brahmans, for his money, are the smartest cattle that ever lived. Still, he admits this is a characteristic that can be found in any cattle, one that can be brought out by careful handling and selection. He breeds in the factor, then gives it every opportunity to assert itself. A stranger can go onto any Lasater range and the cattle will come right up and lick his face.

This is a "real cute characteristic" as Tom puts it, but it pays off. Quiet, relaxed cattle gain much faster than their tense, skittish brethren and it is a lot cheaper to handle them. Two cowboys and one of his older sons (13 and 11 years of age) are all the help he needs to work his herd.

Fertility

Fertility is taken care of on the dam's side by culling. Every female two years old and up on the ranch has produced a calf every year or she wouldn't be there. A nine-year-old cow has produced eight calves, a twelve-year-old cow, eleven calves. And they must be dropped during a 42-day period in the spring. The bulls are turned in with the heifers and cows the first of July for 63 days—three heat periods. The calves begin to arrive the following April 10 and any cow that drops her calf after May 22 is automatically culled. This eliminates the shy, slow breeders. It also insures a uniform calf crop for size and weight.

On the sire's side fertility is insured by the fact that the most fertile bulls sire the most calves. The yearling heifers are always kept separate from the older cows. Yearling bulls are run with them at the rate of one bull to ten heifers. Bulls are

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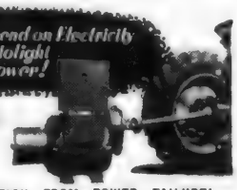

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"I'd give up silage—rather than go back to pitching by hand"

says Walter Petersen, Britt, Iowa.

"I've only had my silo unloader two months, but it is certainly the last piece of equipment I'd part with", relates Walter Petersen.

Mr. Petersen and his son Jim feed 25 head of dairy cattle & young stock. Both are very enthusiastic about their new silo unloader.

"I never realized feeding silage could be so simple. All I do is throw the switch . . . down comes the silage . . . faster than I can carry it away. I never turn on the unloader until I'm ready to feed. 10 minutes time, the entire feeding job is over", says Jimmy.

Mr. Petersen was quick to add, "of all the jobs on the farm that ought to be done mechanically, there's none that rate any higher than throwing down silage. A man is just asking for trouble to climb up a cold ice covered silo chute twice a day, work up a good sweat throwing down silage, and then have to go back out into the cold again with damp clothing on."

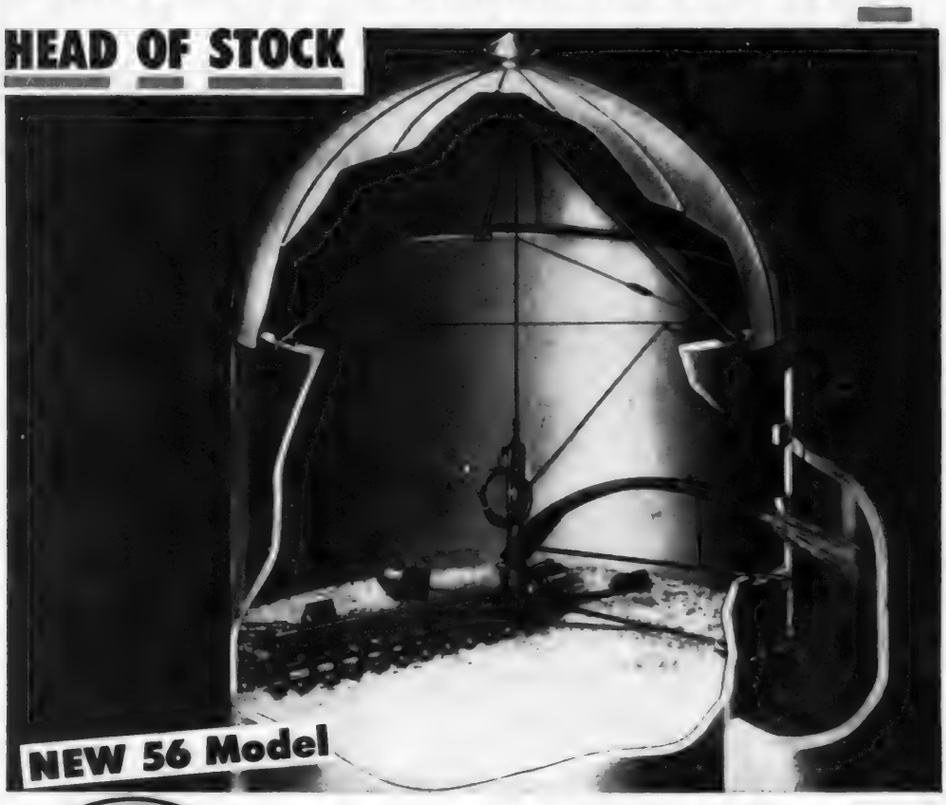
Mr. Petersen's observation is very pertinent. Climbing up and down the silo is a tremendous, and often hazardous task. Although that silo may be only 48 feet high, a winter's feeding means climbing practically 4 miles over an awkard cold, ice covered ladder. If the silo is higher, or has no chute, this job is even more treacherous.

One of the most severe jobs the silo unloader has to do is that of removing frozen silage. "We've had several days of subzero weather this winter and I see absolutely no reason for concern over frozen silage with our unloader. Frozen silage used to be a real problem, not only to break loose in the silo, but also to get it broken up so the cows could eat it. The unloader does both jobs better than I ever did by hand."

"It's amazing" states Mr. Petersen, "the kind of results you get with new equipment. Last winter, when we were throwing down silage by hand, both Jimmy and his older brother were at home to help with the chores. They're both real good boys but when it came time to feed silage, we used to have some real arguments as to who was going to climb the silo."

"That's not the best part of it", Jimmy added. "Since the silo unloader cut chore time in half, I've been able to sleep that extra half hour I've always wished I could do."

2¢ A DAY TO AUTOMATICALLY POWER PITCH ENOUGH SILAGE FOR 50 HEAD OF STOCK



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Mike Behlen
Vice-President
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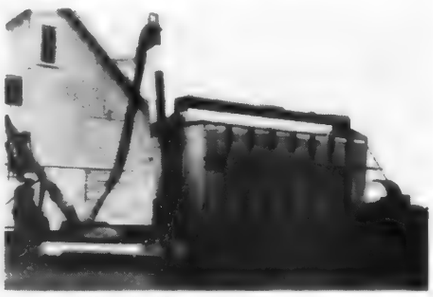

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run with the cows two years old and up at the rate of one to twenty. Lasater has no way of knowing whether he has any infertile bulls in the herd. But he doesn't care. "If I have an infertile bull or a shy breeder," he says, "he doesn't hurt me a bit. All he costs is his keep. The fertile bulls breed the cows and this fertility is perpetuated in the calves.

"Can you imagine anyone trying to make a bull breed when he's shy or infertile, dosing him with hormones and all that kind of stuff? That's the kind of thing a man does when he starts fooling around with high-priced stock. He has a big investment and thinks he has to protect it that way. If a man is trying to make a living raising beef, fertility is priceless. Why would he want to perpetuate the genes of an infertile or shy animal?"

Weight

Weight, of course, is a major point in Lasater's selection program. All the bull calves are weighed individually at weaning and the bulls are weighed at least once a year as they go into service. Low gainers are eliminated.

The heifers are weighed in bunches at weaning and averages taken, and the yearling heifers are weighed at the beginning and at the end of the grass season. Lasater tops out 70 per cent of his heifers for replacements. Although individual weights are not kept in this department, small or pony type heifers are culled by eye. Average weights are kept to make sure the herd is showing progress and culling is guided by the other five factors.

Conformation

A recent visitor to the Lasater Ranch commented on what he felt was a "poor" head on one of the bulls. Lasater's reply was: "Out here we start judging cattle at the hindquarters and work forward. When we get to the front of the shoulders we stop looking. We don't care if they have a head or not. The only thing cattle need a head for is to take in food and water and emit a mating call. You can go to any packing house and buy all the 'good' heads you want for a dollar apiece."

That pretty well sums up the Lasater approach to conformation. If it will make beef—fine. If it won't—forget it. Those points which bear directly on dressing percentage and dressed beef grade are given prime consideration along with the points which make an animal a good rustler. A scientist once pointed out to Lasater that his Colorado ranges are the perfect grazing land, but that an animal must be equipped to get around on them like a buffalo or a horse. "We knew that all along," says Tom. "That's why we've always demanded that our cattle have a long, easy, swinging stride. A critter with a short, muscle-bound gait can't make it."

Lasater pays no attention to color or horns. Those are just distractions in his quest for beef characteristics; they have

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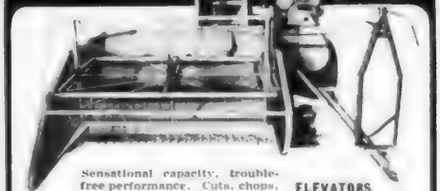

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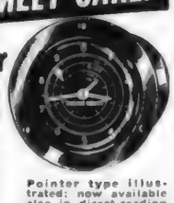

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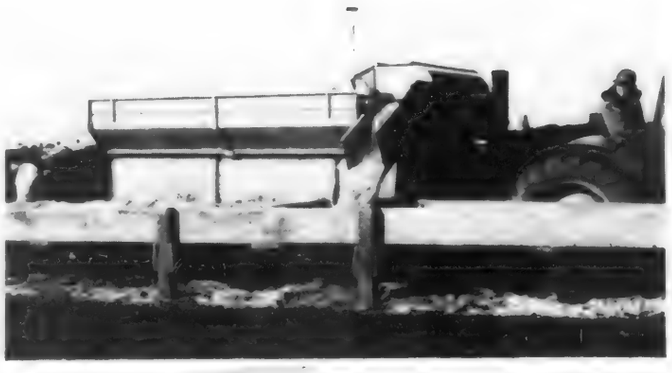

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no correlation with beef making ability. He admits that many breeders have been able to control color and at the same time produce outstanding cattle: but, he argues, they have sacrificed a high percentage of potentially good genes to get this color. The price is too high.

Many kibitzers have suggested that he try to breed the horns off his cattle. "Why complicate matters," he asks, "to do a job any farmer can do for twenty-five to fifty cents."

His reply to the popular enthusiasm for a "mellow, loose hide" is that he has never seen a steer whose hide didn't go all the way around him.

Hardiness

There is only one test for hardiness that will satisfy the Beefmaster's originator—survival of the fittest. In his herd there is no excuse for weakness. He defines hardiness as the animal's ability to maintain itself in a healthy, vigorous condition on the range without any assistance from man. The Lasater cattle are vaccinated against Black Leg, they are dehorned, they receive a little hay and some alfalfa pellets in the winter and that is about all the help they get. Any individual which needs treatment that is not herdwide in its application is culled. If a cow needs her hooves trimmed, if she needs assistance in calving, if she has to be milked out to prevent a caked udder, out she goes. If a bull develops sheath trouble he is dropped.

Result: A herd that is free from cancer eye, pinkeye, Bang's disease; cows with sound udders that provide a maximum of milk for their calves; healthy, vigorous bulls. The average production life of Lasater's cows is 14 years.

The feeding schedule was touched on above but it should be mentioned again as it is one of the tools in the development of hardiness. The cattle are expected to thrive under rough range conditions. In summer their only feed is the grazing they can rustle for themselves. Winter feed is 2 pounds per day of dehydrated alfalfa pellets with 12 per cent blackstrap molasses added to the pellets. This 17 per cent protein feed they get for 100 days, from December 15 to March 25. Hay is fed only during storm conditions when the cattle can't get grass. Only the yearling bulls get supplemental protein—6 pounds of a grain protein pellet beginning at weaning and tapering off in the spring. At a price of $60 per ton for the alfalfa pellets it costs Lasater around $6 plus whatever hay she eats to winter a cow.

Milk Production

"We're in the milk business the same as any dairyman," is Lasater's comment on his herd's milk production. "Our cows must give enough milk to wean a big, husky calf. How much that is we don't know and neither does anyone else. Some people will try to tell you twenty-five pounds of milk a day is the optimum. We say twenty-five thousand pounds isn't too much if the cow and calf can handle it. The sky's the limit." Selection for milk production has been controlled by culling both the cows that failed to wean calves of qualifying weight or better and the cows that required milking at calving time.

Those are the Lasater standards and he sticks to them with grim tenacity. Any cow that drops a calf one hour after the 42-day period in the spring is a goner. If a cow loses a calf from any cause out she goes. Tom Lasater insists that it is only by this kind of absolutely ruthless culling that a man can make progress in cattle breeding. It is the only way to throw out every single lemon; the only way to continually raise the quality of the average of the herd.

Another Lasater rule is to make as few decisions as possible. "Let God decide" is one of his most frequent admonitions. "We didn't decide what kind of udders our cows should have," he says. "We selected for milk production and God put the udders on them."

Topping Out

After a man is completely steeped in a philosophy of breeding like this the actual culling and topping out of a herd—making them run the gauntlet, as Lasater calls it—is practically automatic.

"You don't want to waste your time fooling around with the outstanding individuals," he warns. "They're nice to look at and all that but the place where you have to put your time and judgment to work is on the border line. It's just like a man going through a forest looking for trees of a certain dimension. Those that are well above or below that size he never gives a second look. The border line cases demand his time.

"So at weaning time when we are topping out our heifers we make a rough cut first, top and bottom. Then a top heifer in the cull pen or a cull heifer in the top pen will stick out like a sore thumb. Then we mill through the pens looking for minor points, maybe clicking in ankles and hocks indicating a tendency toward double jointedness and an inability to carry weight. We're all the time watching for skittishness and signs of a nervous disposition.

"We know all the calves come from fertile stock since we have already eliminated all those dropped after the forty-second day of calving; we've checked them all on weight; we've given them the once over for conformation; we know that if they and their sires and dams hadn't passed the test for hardiness they wouldn't be here; and we can get a line on their dam's milk production from the calf's size and condition. First thing you know our topping is finished."

Calving time is the main culling point for the cows. That is when those that fail to drop a calf or calve after the 42 day period put themselves on the check-out list. Then some more are culled in the fall for having raised a poor calf.

The bull gauntlet starts at about two and a half months. Obviously poor calves are castrated at that age. This year 53 bull calves were saved and 71 castrated on the first go-round. Eleven more were cut in September and an additional selection was made at weaning time. The yearling bulls are weighed and a final selection made before they go into service and they are weighed and topped out every year thereafter.

The entire Lasater operation is keyed to the production of breeding stock under rough range conditions. The steers and cull heifer calves go to market right off the cows at weaning time. Nine or ten yearling bulls go into the herd along with ninety to one hundred heifers. Bull calves from the top 30 per cent of the crop are offered to the public for breeding purposes.

The Lasater program is performance testing carried to the extreme. He admits that in a program in which the majority of the decisions are left to nature, numbers are a man's best friend. Yet he is convinced that even the man with only a 20-cow herd can lift his stock far above the average and make continual progress if he will only limit his goal, cull ruthlessly—and let nature make most of the decisions.

"One of the country's larger breeders unintentionally paid us the finest compliment we've ever received," he says. "This breeder told a friend, 'Nature has done for Tom Lasater what he refused to do for himself.' "

OFF-SEASON IRRIGATION

(*Continued from page* 35)

Twenty miles down the road from Asche lives another farmer who believes irrigation can be a profitable year-around job. Ed Brezina, of Bellwood, irrigated 60 acres of his winter wheat, putting on six inches in October and another five inches in late March. Because of a water problem, he was unable to irrigate the rest of his wheat. He missed the hail storm that beat out part of Asche's crop and his irrigated wheat averaged 62 bushels to the acre while his unirrigated wheat made a scant 14 bushels. Brezina's water costs, which include fuel, depreciation and labor, were 88 cents an acre inch. This is 26 cents more than Asche, with his more efficient unit, had to pay.

Perhaps the most scientific work that has been done on off-season irrigation is that of Dr. Leon Chesnin, Associate Professor of Agronomy at the University of Nebraska, who keeps a managerial eye on his father's 880 acre farm. Chesnin, who looks like

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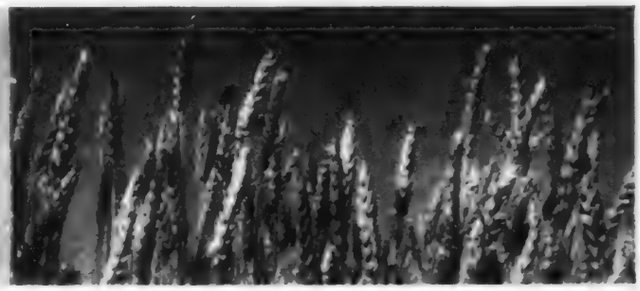

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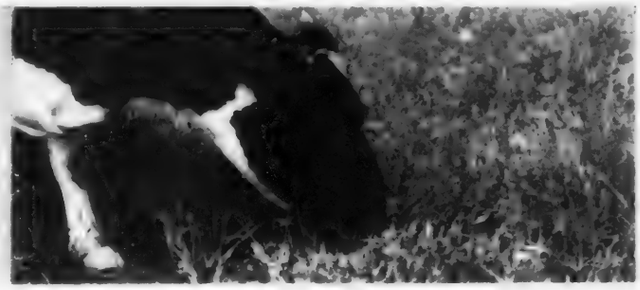

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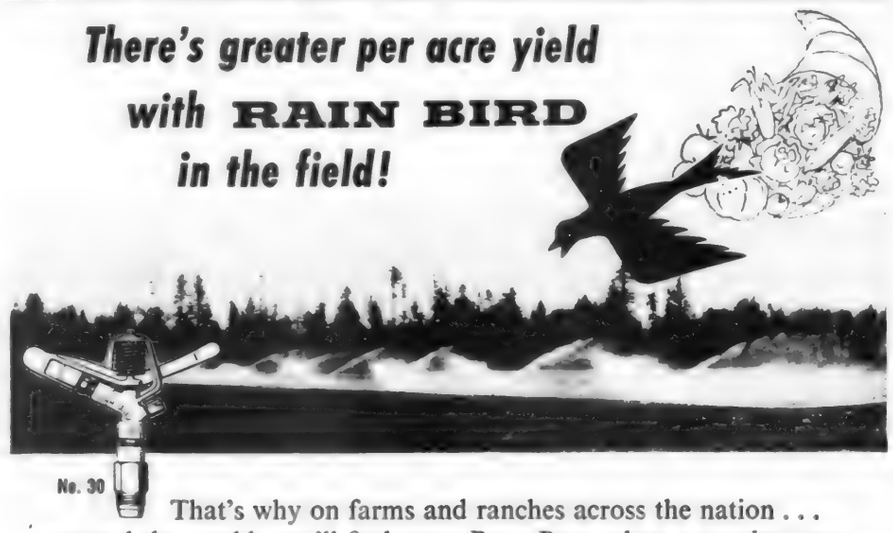
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a farmer in a business suit and who uses a spade almost as often as he uses a pencil, believes that an understanding of the root systems of the plants being watered is essential to developing proper irrigation. "I've chased alfalfa roots down twenty feet in our deep Nebraska soils," he said. "and we've found that in six years these alfalfa roots will pump all the available water out of the soil for more than twenty feet. Brome grass can sap the soil of its water for five feet—six if you give it plenty of nitrogen. And corn and wheat will go six feet."

Chesnin's off-season irrigation plan consists of a priority system which is designed to put water down into the root zones of those crops which can use it first and which will pay off in cash returns. In applying his system last year, he took the irrigation equipment off his 296 acres of corn around the middle of September and put it to work on the 61 acres of wheat land, sprinkling on 10 inches of water to soak the soil to a depth of six feet. Then the wheat was planted. Later, 50 pounds of actual nitrogen per acre were spread on the land.

Next, the system was moved to 40 acres of alfalfa land and 20 inches of water applied, which saturated the soil to a depth of 10 to 11 feet. This was the only water put on this crop during the entire growing year.

Last year, with its mild winter which left the land open until well into January, some pasture, oats, and barley land was irrigated. Chesnin feels, however, that these low return crops can hardly be given a choice spot in his irrigation plans.

"We feel that it is best to delay irrigating the corn land until spring," Chesnin said. "By that time, we know how much winter moisture we have in the soil and we can add just enough to wet the earth down to around five or six feet. Last spring, after a very dry winter, we applied eight inches of water to wet the soil four or five feet. Then we plowed down a hundred and twenty pounds of actual nitrogen —we did this after soaking the land so that we wouldn't leach it out with our irrigating. We don't need potash or phosphate for our corn though we put on around sixty pounds of phosphate per acre for each year we plan to keep the land in alfalfa."

Knowing that he had plenty of fertility and moisture in the soil to give his corn a good start, Chesnin, who watches all the angles, delayed planting until the last week in May and by-passed the first brood of corn borer. Summer irrigation of corn didn't start until the first week in July and it was toward the end of this first time over that the pre-season irrigation paid off.

"I went to the farm," Chesnin recalls, "and found that the tenant was worried. He told me that the unirrigated corn was wilting during the day and, in figuring the time it would take him to get over

the rest of the land, he had about decided to abandon one twenty-three acre patch. I asked him if it was making a recovery at night and he said, 'Yes.' I then asked if he had gone out with a spade to see if there was any moisture in the soil. He said he hadn't. This did not surprise me—there are few farmers who dig down to see for themselves how much moisture there is. A soil probe that will cut a plug of earth six feet deep only costs four or five dollars, and moisture meters aren't too expensive considering what they tell you, but not too many farmers use them.

"Well, to get back to the story," Chesnin continued after his brief lecture, "we went out into the field with a spade and dug a hole in the field. We found the top two feet dry, but below that there was plenty of moisture—the earth balled nicely—and the roots were down in it. We had all of three feet of moisture left, a good two weeks' supply even when corn is using a quarter of an inch a day, which is all that it does under the most severe conditions. I told him to go right ahead and irrigate all of the corn. He kept at it and the crop didn't suffer a bit."

This reserve of moisture stored in the soil which saved 23 acres of Chesnin's corn crop is one of the chief benefits he sees in the off-season irrigation of corn. It gives the farmer a chance to cover all of his land and to take the time to hit a dry spot or two if the wind blows his sprinkler pattern off the planned coverage. And complete coverage is one of the things Chesnin insists on. "We burned fifty-five thousand gallons of propane gas running our three pumps last year," he said, "and we certainly want to get our money's worth from it."

To hit all possible dry spots, Chesnin follows what he calls a triangulation system of watering. Sprinklers are spaced at 40 foot intervals along the laterals and the laterals are moved down the main line in 60 foot jumps, though there are attachments for the laterals every thirty feet. With Chesnin's system, the lateral starts the irrigation season by watering from the first outlet, then being moved to the third, then the fifth, and so on at 60 foot intervals down the line. The next time he waters the field, he attaches the lateral to the second, fourth, and sixth outlets which puts his lateral line halfway between the settings used the first time over. On this second round, he also inserts a 20-foot stub pipe between the end of the lateral and the main line so that each sprinkler is moved to a position half-way between the first settings.

From the first week in July, when summer irrigation was started, the system was kept running day and night over the 296 acres of corn land so that they could get over the crop once every two weeks.

Chesnin's wheat yields were not as spectacular as those racked up by Asche and Brezina, but his wheat, alfalfa and corn

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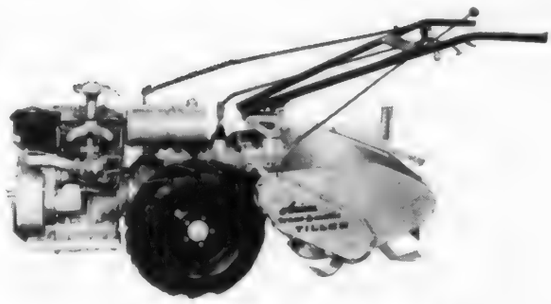

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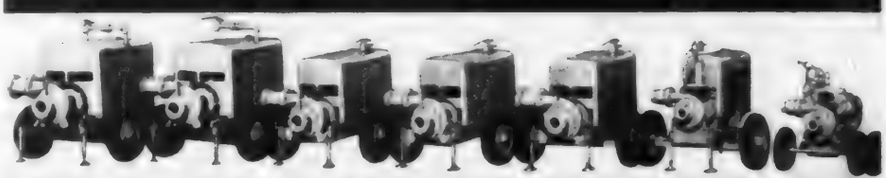

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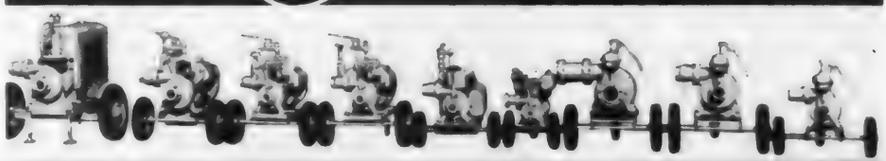

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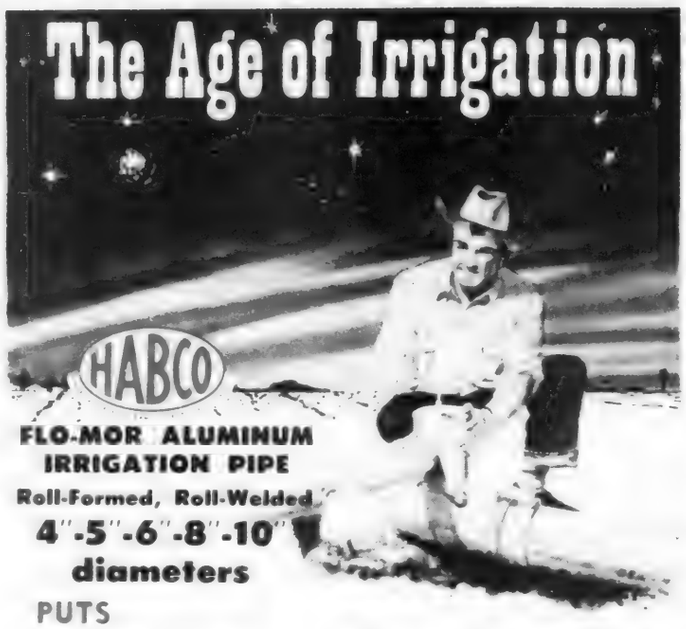

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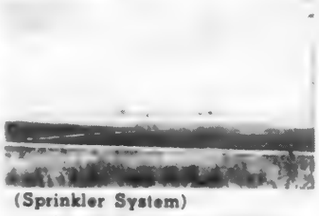

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certainly proved that off-season irrigation will pay its way. He averaged 40 bushels of wheat to the acre, the alfalfa yielded five and a half tons to the acre with four cuttings, and the corn ran between 75 and 100 bushels to the acre (the final corn figures were not in at the time of this writing). This, at a time when the whole western section of the corn belt was suffering so badly from the drouth that the total corn yield for the nation had to be scaled down after a bumper crop prediction. "But big yields aren't all that we get out of irrigation," Chesnin points out. "Around here, buyers are willing to pay a premium of five to ten cents a bushel on corn because of the extra feed value. And you don't get docked for a little extra moisture."

In summing up his experience with this new method, Chesnin freely admits, "There is a lot yet to be learned about off-season irrigation. From our experience, however, I feel that it is an excellent practice for farmers in a rainfall deficient area who are farming deep soils. On many Nebraska farms we can put all the moisture the crop needs in the soil during the off-season for wheat and alfalfa and a part of the crop needs for corn. On sandier soils we would only be able to do part of this job, but that part would be a big help when the rush of summer irrigation came. In parts of the country where they get all the winter moisture they can possibly use, spring irrigation can be held as an ace in the hole for that occasional year when they have a winter drouth. On poorly drained soils, it might even be a dangerous practice. As with all irrigation, the most important factor is the soil and crop you are watering. Figuring all costs, including depreciation, the greater the use we make of our irrigation systems, the lower will be our per acre cost of watering."

SUBSOILING

(*Continued from page* 73)

was to plow for corn, primarily as an experiment, water laid on the surface when neighbors' corn had already been planted. We let the untouched field dry out. In August, with the surface like cement, a field tiller hardly scratched the withered poverty grass. After light September rains, the field tiller did a fair job of loosening the surface to about a 5-inch depth in 2 opposite passes. Then we opened a series of ditches at 20 to 30-foot spacings with a wing ditcher, followed by a tractor dozer blade. This gave the effect of bedding with open dead furrows. A hook-type mounted subsoiler was run in the bottoms of the ditches, slicing the soil an additional foot deep. Finally, the entire field was subsoiled, parallel to the ditches, all slits and ditches ending in a cross ditch which was dug to keep the runoff from the woods from flooding the field at random.

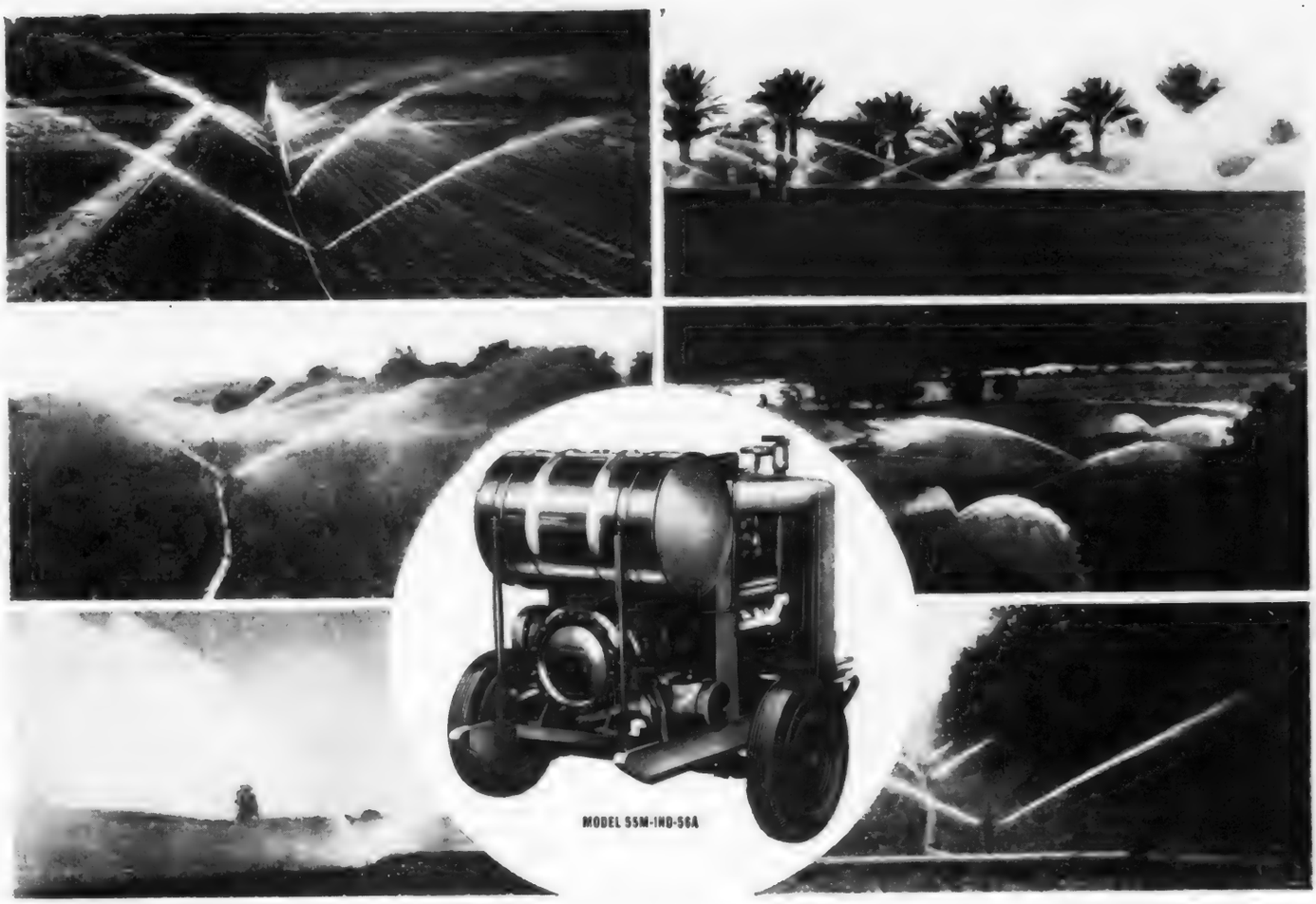
We used four-foot intervals, mostly because that was the minimum tractor wheel spacing, and by setting the inside wheel in the track left by the outside wheel at each reversal of direction, a line could be held. Luckily, this spacing was close to what I found later would be recommended under the conditions. We held the subsoiler at an 18-inch depth.

That was four years ago. Rye and timothy were planted, with clover broadcast the following spring. It took five tons of lime per acre to bring the ground up to legume pH and though the trial alfalfa and birdsfoot trefoil in the grass mixture never took, the ladino, now in its third year, has been carrying enough sheep to more than pay the costs involved, with one cutting of hay a year as gravy. No miracles had been accomplished, but at least we could claim ownership of the field without squinting.

That minor victory prompted us to treat a rolling meadow in the same manner, with considerable trash left on the surface.

Wheat was planted: the stand was above average and appeared exceptionally healthy throughout the season, but the crop turned out about average. Erosion, from observation, was reduced to zero.

The other side of the picture hit me square in the face last year. I attempted subsoiling for corn. A moderately rolling,



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NAUGATUCK, CONNECTICUT

Mr. W. O. Forman, President
Fitchburg Engineering Corporation
Fitchburg, Massachusetts

April 25, 1955

Dear Mr. Forman:

The Fitchburg Chipper, Model C-9, which we purchased in 1951 is performing most satisfactorily. We use it at our sawmill mostly to chip pine slabs for stable bedding for our dairy cattle - 102 cows in milk this month. Pole wood, or any hard wood can be chipped as well.

We have a blower attachment so chips are blown into a sawdust pile from the mill. This not only keeps our mill yard cleaned up but furnishes bedding at a saving of about $4.00 per cord. That's a saving of almost half the cost of what we've paid for purchased sawdust or shavings for bedding.

The cost of the upkeep is very low. Knives have to be sharpened every ninety to one hundred hours, but by having two sets of knives we can be using one set while the other is being sharpened. We have found it to cost much less to send you the knives by parcel post for sharpening than to have it done locally. This service is prompt and we're always sure of a good job.

? We find Fitchburg Engineering Corporation a very good company, giving prompt and efficient service.

Very truly yours,
J. H. WHITTEMORE COMPANY
Charles W. Miller
Charles W. Miller
Farm Manager

Another Fitchburg Chipper—Model C-6 in action cleaning up wood lot. Chips are used for stable bedding. C-6 easily handles wood up to 4" in diameter, planks 6" wide.

Fine chips made with Fitchburg Chipper used as bedding in dairy barn. Highly absorbent, and have good holding properties. Purdue University says: "Shredded wood chips used in bedding tests in the Purdue Dairy Barn stayed in place better than straw, ground corn cobs or shavings."

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Largest peach orchard east of Mississippi – Sunny Slope Farms, Gaffney, S. C., and Bridgeton, N. J., uses Fitchburg Chippers to chip prunings, branches, limbs, into ideal mulch for their 1600 acres of peach and apple trees.

Says Alfred F. Caggiano, Bridgeton Farm, Asst. Manager, "Our Fitchburg Chippers are serving us a twofold purpose. Not only do they save on time and labor, but the chips serve as ideal mulch."

You too, if you have wooded acreage on your farm, can use a Fitchburg Chipper profitably for stable bedding, mulch and poultry litter. There is a Fitchburg Chipper for every need and every pocketbook—from as low as $960.

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poorly drained field of meadow aftermath was given the full treatment. It was a wet season and surrounding corn crops were good. My corn was an out-and-out bust.

What Is the Answer?

Why did subsoiling work on part of my land and fail dismally on the other part? Why did 11 out of 12 experiment stations answering a questionnaire put out by the Virginia Polytechnic Institute in 1955 reply that they found no appreciable increase in yields from subsoiling while Mississippi reported marked response from this practice? Why do farmers such as William S. Barclay, a potato grower near Cranbury, New Jersey, Carl Neitzke, a corn belt farmer in Lake Port, Iowa, Kenneth Bever, of Manteno, Illinois, F. A. Brumley, a grain grower near Denair, California, and Austin Bordeaux, a cotton raiser from Wilmont, Arkansas, all report unusual success from subsoiling while, if you hunt them out, an even larger number of farmers simply grit their teeth and prefer not to talk about it?

The answer to this one, like so many answers in farming, probably lies in the soil itself. The purpose of subsoiling is to increase drainage and permit greater root penetration by destroying a solid, waterproof floor that has formed somewhere below the plowed area. The nature of this floor is one of the things that will help us find the answer to these questions. The floor can be of three different types: (1) a hardpan, which is a cemented layer formed over the geologic ages, (2) a claypan, which is a layer of clay laid down sometime in the geologic past, and (3) a plowpan, which is a hardened layer formed by the compression of the plow sole and the weight of equipment plus the depositing of the fine disturbed silt from cultivation. The plowpan is, of course, just below plow depth; hardpans and claypans may appear at any depth.

The kind of layer that is causing the farmer's drainage problem also determines the success he will have with subsoiling. Professor Charles H. Nissley, Vegetable Specialist at the New Jersey Experiment Station, has pointed out that when the hardpan type floor is close enough to the surface to reach and shatter with a tool, subsoiling can be really effective. The hardpan, which took thousands of years to form, can be shattered once and for all by subsoiling and one such job should last a lifetime. Once broken, the roots of the plants can penetrate to greater depth and there is no longer a barrier to water movement.

When a claypan is the water stopper, Professor Nissley points out, the problem is entirely different. A subsoiler pulled through the claypan will open it up, but only for as long as the clay remains relatively dry. Once the rains wet the clay, it will flow together again like warm taffy on a plate and form just as tight a layer as if the farmer had never spent the money

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to pull the subsoiler through the field.

Professor Nissley looks on the breakup of the plowpan as a doctor might look on the curing of DT's—no sense curing them unless the patient is willing to take the pledge and stop forming them. Crop rotation, erosion control, organic matter in the soil, mulch protection of the surface, will all help prevent the formation of a plowpan—subsoiling will break it up once it is formed. But subsoiling too often will tend to form a new plowpan at a greater depth.

From this it would appear that if the hardpan can be shattered everything is dandy: if a claypan is present, all is lost. Things are never quite that simple. Shattering the hardpan may bring on other problems. The farmer knows that the hardpan is holding water on the surface of his soil and keeping it from percolating down: what he can't see from the surface is that the hardpan may be holding a great deal more water under pressure below its floor and breaking the hardpan will make the field even wetter. Therefore it would be well to plan on a good tile system or surface drainage able to take care of this situation.

A claypan will inevitably close up when the clay gets wet enough, but this closing can be delayed for as long as four years by the application of gypsum. Through chemical action with the colloid of the clay, the gypsum causes granules and cracks to be formed so that air and water

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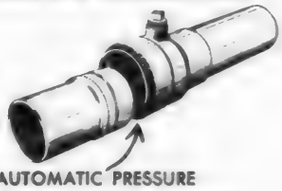

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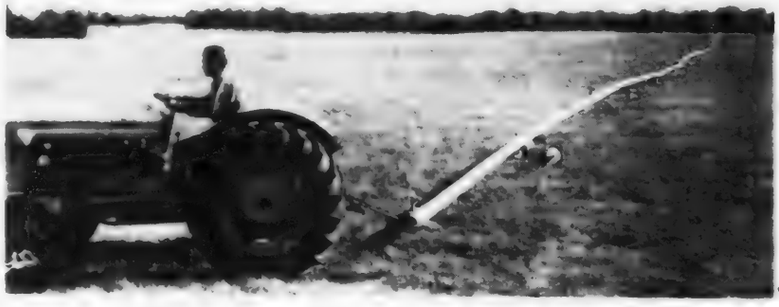

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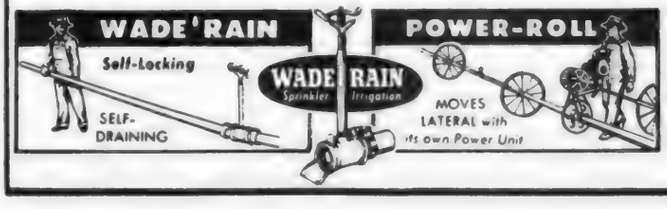

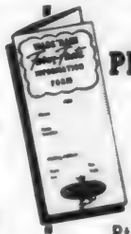

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Meanwhile, Dairyman R. W. Kent of Siluria, Alabama, used portable aluminum sprinkler irrigation on his 75 acres of pasture. He grazed a herd of 80 Guernseys on this land 10 months a year, cut 300 tons of clover-grass silage after taking the animals off, then cut and stored 1500 60-pound bales of hay. Lightweight aluminum permits Mr. Kent and his son, Douglas, to move the system up and down a stream, providing irrigation for over 200 acres of land when necessary.

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and roots can move down freely. Since the operation will have to be repeated every three or four years, the value of the crop to be grown must be considered in deciding whether the cost makes the operation worthwhile.

What's a Farmer To Do?

The first problem, then, in deciding whether to subsoil is, "Will subsoiling help my ground and for how long?" The answer to this can be found with a spade. Test holes dug in several places over the field should show whether the floor under the field is made of hardpan cement, clay, or packed and silted plowpan. These tests will also show whether the pan can be reached with present day shattering tools and they may show what to expect in the subsoil beneath the pan. If the pan is a plowpan the farmer need have no worry, because the plowpan was formed only on fertile, long used soil; a hardpan floor, however, may hold some surprises.

After determining the nature of the floor, the next question is, "Are the crops grown on this land worth the cost of shattering the hardpan or the even greater cost of slicing and gypsum treating the claypan?" Thoughtful answers to these questions will tell whether it is possible for subsoiling to do any good and whether it is desirable to spend the money on the operation.

One other cost factor is worth taking into consideration when making this decision. A number of soil scientists are wondering whether subsoiling alone, or subsoiling with gypsum in the case of claypan, is enough.

The Present Trend

The emphasis is now on subsoiling plus deep fertilization. Behind the theory is the conviction that there is no point in subsoiling to permit deeper root penetration only to find the subsoil is too deficient in nutrients to support root growth. As a matter of fact, some subsoils are quite toxic to plant development. Results of experiments to date are varied.

In a 1953 experiment on gray soil underlaid with acid, infertile subsoil, Indiana researchers found yield increases of soybeans and hay insignificant under deep fertilization. However, corn yields were upped from 75 bushels per acre under no treatment to 83 bushels with subsoiling and 97 bushels under deep fertilization. They recommend deep lime and fertilizer only where tests show nutrient deficiencies in the subsoil. A hundred pounds each of nitrogen, phosphate and potash are suggested, spaced at from 3 to 5 foot widths and 20 to 24 inch levels, according to the depth of the compact layer. The purpose of the heavy fertilizer applications is to extend the time before repeated subsoiling and fertilization are necessary. Dr. Helmut Kohnke of Purdue University, a recognized authority on subsoiling, said. "We feel certain that subsoil fertilization

on many soils will not only enlarge the yield and make it safer from the vagaries of the weather, but will also cut down on run-off and erosion."

Hugh M. Wilson, New York State Conservationist, gave me the opinion that more knowledge is needed of deep fertilization combined with deep tillage as opposed to deep fertilization combined with moldboard plowing. In telling of a New York corn experiment where the subsoil was shattered, and deeply limed and fertilized, without plowing, he said, "What happened? Nothing at all. We got absolutely no results, no change in corn yield. Furthermore, no instrument now available to science showed any difference whatever in the soil itself. Remember, that was in New York. The story might well be far different somewhere else."

In an adjoining state, New Jersey, the story *is* far different, especially on fertile, highly organic and continuously cropped vegetable farms. Professor Nissley, New Brunswick vegetable specialist, one of the first to try deep fertilization, has conducted over three hundred demonstrations of applying lime, gypsum and commercial fertilizers at deep levels under high-profit truck crops.

With the knowledge that subsoil nutrient deficiencies can seldom be corrected by surface applications of lime and fertilizer, Nissley designed equipment for deep placement of fertilizer. Asparagus planted over deeply fertilized rows developed roots in one year equal to those of normally planted three year old roots. Yield was doubled in several instances. Results with potatoes were as follows: no treatment, 265 bushels per acre; subsoiled, 334 bushels; subsoiled plus superphosphate, 317 bushels; subsoiled plus lime, 329 bushels; subsoiled plus lime and superphosphate, 353 bushels. In one test, sweet potato yields were not only increased, but a more desirable root-shaped rather than rounded sweet potato resulted. In another potato test, check plots yielded 157 bushels, with subsoiled plots plus gypsum yielding 170 bushels. On one farm, a two acre piece of what had

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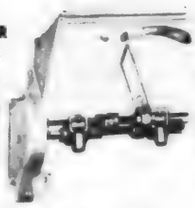

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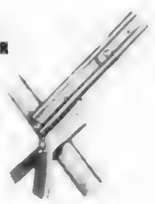

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been considered wasteland because it held enough surface drainage to be called a pond most of the year was subsoiled and deeply fertilized in a dry season. Two years later, a wet year, the area produced 200 sacks of potatoes per acre. In other tests, vegetable roots under normal plowing never penetrated below plow depth. Under deep fertilization, cabbage roots reached an average depth of 20 inches, spinach 30 inches, sweet potatoes, parsnips and tomatoes 26 inches, sweet corn and beets 22 inches.

Were these results immediate and lasting? "Not immediate, but reasonably lasting," Nissley explained to me. "In 'most all cases," he said, "first and second year results were negligible. The big yields I have pointed out began in the third season following initial treatment, without repeating the treatment. But good yields continue beyond the fourth and fifth year after treatment."

Equipment for deep fertilization has so far been of the home-made variety, though one or two manufacturers have recently put models on the market and a few others are soon to appear. Such equipment is of simple design, consisting merely of a fertilizer hopper with some sort of metering device or ground-wheel feed, the entire device being attached to a conventional subsoiler in such a manner as to deliver lime or fertilizer at subsoiling depths. In the opinion of Dr. Kohnke of Purdue, best results come from equipment that delivers the fertilizer through a series of holes at varying depths from the chisel point upward. Fertilizer placed at one deep level below the young root zone may never be reached by plant roots. By placing the fertilizer in a vertical band all the way from plow depth to subsoiling depth, roots have a far better chance to continue downward penetration, not only for drouth insurance and benefit to the current crop, but as a means of keeping the subsoil open and charged with organic matter and bacterial activity.

It's Up To You

After being kicked around for nearly a century, subsoiling is still a controversial practice. However, it is apparent that simple subsoiling is pretty much of a waste of tractor fuel on clay soils underlaid with deep layers of impénetrable subsoil. On soils where a reasonably thin layer of compacted gravel or loam subsoil prevents root and water from penetrating down to more porous levels, subsoiling, while working no wonders, has frequently more than paid its own way.

I'll go along with the notion that there is no use in opening up, by subsoiling alone, a subsoil deficient in nutrients. In such cases, deep fertilization is looking more and more like the answer. Many soils, if underlaid by acid or infertile subsoil, with no serious compaction problems, might benefit from deep treatment.

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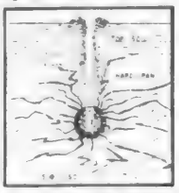

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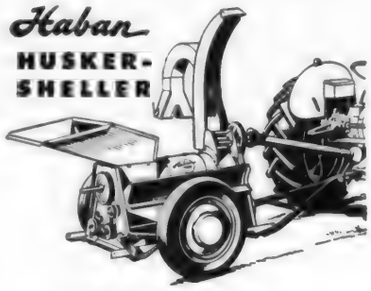

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(*Continued from page* 46)

the highly mechanized Easterner. There is a minimum of automatic feeders and waterers, and the buildings in many cases are a far reach from being chicken palaces. Automatic feeding equipment will likely remain at a minimum in Arkansas as long as the farm family retains its hold on the industry, and outside labor is easily obtained at a fairly low wage.

Men Who Set the Pattern

Typical of the men who have spark-plugged the Arkansas broiler industry is C. B. Fraker of Springdale. Fraker is 38, and he started his first batch of broilers when he was a lad of 19, in 1936. There were 350 birds in his first batch, which he hatched in three old kerosene incubators. He now has eight different farms on which he places 120,000 broilers at a time. By making four placements a year, the usual practice in this area, he turns out nearly a half million broilers a year.

During the summer he sells the birds at 3 pounds in 10 weeks; in winter he markets them at a little less in 9 weeks. During the periods between batches, he cleans and disinfects the houses, and works over the litter or changes it if necessary. He feeds a carload of feed every week.

One of his farms is over the line in Missouri. He unloads most of his feed there in order to take advantage of a differential in freight rates and to escape the higher Arkansas sales tax. The Arkansas sales tax, about 10 cents per hundred, was repealed after a hot political battle last summer, but the issue is still in doubt.

Fraker hires a caretaker for each 20,000 broilers, shunning automatic feeders. "A man can watch a flock and care for it much better than a piece of machinery can," he says. "My mortality losses average from 25 to 30 per thousand. The hatchery gives me 20 extras per thousand, so I take out almost as many as I pay for."

His chicken houses are not elaborate. He built a number of them for the low figure of 27 cents per square foot. He builds for good ventilation and easy heating, but not for eye appeal.

Heating is one of Fraker's economy items. While drilling for water a number of years ago, he struck gas and has enough to provide heat for 20,000 broilers, his

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home and the home of a tenant. Free heat for 80,000 broilers a year is a good profit in itself.

"I accidentally had a piece of good luck last year," he said. "It was the worst year I've had pricewise, and I would have been dollars behind if I hadn't run out of water and skipped a batch that might have lost money. Since the three batches I had that year were off before the market hit low, I didn't do so bad."

Fraker's business started out as a family affair, which it still is today. He has two sons and a resourceful wife who help him with management and labor.

Dick Pizza is another operator who got into poultry when the fruit industry collapsed. He is an offshoot of the nearby Tontitown Italian colony and still has a few acres of grapes which he regards as a sideline to his broilers. He is not the giant that Fraker is, but makes money and keeps the profits in his own family. He raises four batches of broilers of 10,000 each a year, doing all the work himself and milking a few cows on the side. He has a good-sized farm of 180 acres which he says doesn't pay him to work. His pastures are usually way ahead of his few cattle. The frost got his grapes last spring, but he lost no sleep over that.

During the hot spell of last summer he turned his chickens out in the fields. "They ate grasshoppers and grass," he says, "and I didn't have to feed them as heavy, but they didn't finish out as fast." Pizza used propane in his brooders until last year when the gas company put in a line to his place. He finds his heating costs cut in half with natural gas. He pays cash for his feed and chicks and takes the discount. His chicks cost him 13 cents each last summer, about the average for good stock at that time. He figures that he gets 36 pounds of chicken meat for every 100 pounds of feed.

Roy Ritter, a big grower, works both ends against the middle. He not only is a feed dealer, financing chicks and feed for many farmers, but he feeds out broilers in the multi-thousands and dresses them for market. As an outlet for some of his broilers he has an eating place, Ritter's AQ Chicken House, famous all over northwestern Arkansas as a place where one can stuff himself with choice drumsticks and white meat at a reasonable price.

Arkansas Chicken Facts

Figures in the millions, as hard to comprehend as they are, must be used when speaking of poultry. Washington and Benton Counties and edges of adjoining counties in northwest Arkansas produce about 55,000,000 broilers a year. The total production of the state last year was about 85,000,000. This is about 10 per cent of national production, and places Arkansas second only to Georgia.

There is little or no egg-for-food production in this part of Arkansas. Fifteen years ago most of the chicks were shipped

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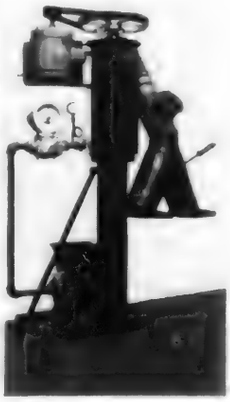

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in, but almost all are now being produced in the area. Chicks are not sexed: pullets and cockerels grow up together. When ready for market the pullets will be a few ounces under the cockerels. Peter Fox, of Fox Deluxe Foods, has just completed 7 mammoth layer houses near Springdale, with a total capacity of 25,000 layers in cages. The eggs will all go to market as a fancy graded product. Many of the large broiler producers keep their own laying flocks to stock their hatcheries.

Arkansas collected, until this year, a 2 per cent tax on feed. This tax was repealed by the legislature, but was contested and the appeal will be taken to the voters. The tax is a sizeable item when a grower is feeding a carload of feed a week, and considerable bitterness has generated between the poultrymen and educational groups, who objected to the repeal on the grounds that it took money from the schools.

The cost of production (the break-even point) in northwest Arkansas is variously estimated at from 18 cents to 22 cents. per pound of live weight. Those who quote the low figure probably fail to allow themselves the going wage for labor: the higher figure reflects the cost of hired labor. Live prices last summer hovered around 26 cents per pound. With a sharp pencil, a farmer producing four batches of 5,000 each (about the average) weighing three pounds, could figure he would clear about 18 cents per head if his break-even point was 20 cents, a total net income of $3600.

The green, rolling hills of northwest Arkansas, with veins of fine limestone water, is a healthy spot for the chicken industry. Disease is probably less a problem here than in crowded population centers, but nevertheless it is a problem.

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- Over 1800 ROP Candidates trapnested yearly. Records up to 357 eggs.
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- Pullorum-Typhoid Clean, Ohio-US Certified day old chicks and hatching eggs.
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Anhydrous Ammonia
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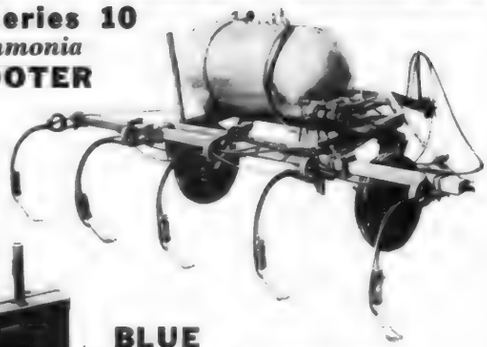
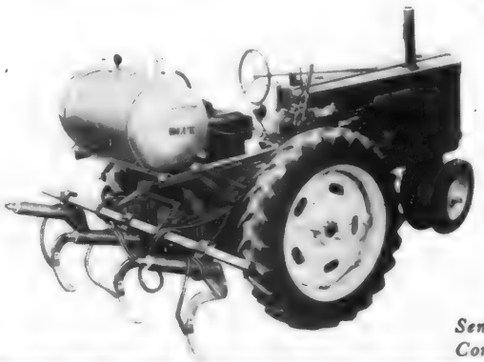
This popular trailer type applicator rig is designed for both row crop and broadcast application. There is a BLUE trailer and tractor mounted anhydrous ammonia applicator available for every Row Crop and Pasture use.





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The chief disease at present is air-sac, a close relative to Newcastle and C.R.D. Air-sac came in a couple of years ago after the medicine men had licked Newcastle. Aureomycin is being used with good effect to combat air-sac. All chicks are pullorum tested and vaccinated. They have a saying in Arkansas that anything that can be cured in two weeks is either Newcastle or bronchitis; anything else is C.R.D., and you might as well put up with it. Antibiotics will ward off secondary invaders, but won't touch C.R.D.

The Arkansas broiler gets but one feed during his short and happy life. Starting and growing mash are the same, but after five weeks he may get it in the form of a pellet instead of as meal. A good average figure for feed conversion is 36 pounds of meat for 100 pounds of feed. Some growers claim a little better, depending on the season and "when things go just right." They say that 12 years ago it took 12 weeks to bring a broiler to 3 pounds; now it can be done in 9 weeks and 4 days. A curious experimenter has done it in 7 weeks, but the feed cost was twice what the bird was worth. The chief reason for the shorter growing period, experts say, is that animal fats have been increased in the feed and as soon as the scientists find a way of getting a chicken to assimilate more, the growing period will be cut still shorter. New strains have been developed for fast early growth.

While the home owned and financed operation is the backbone of the Arkansas industry, even the most solvent of operators sometimes needs credit. The big outlay comes four times a year, and the family bank account can't always support the cash outlay for 10,000 chicks and a carload of feed. The feed dealers have borne the burden of credit. The operators say that more lenient financing by the banks and insurance companies would stimulate the industry. The usual method of financing is for the dealer to furnish feed and chicks, taking a chattel mortgage on the chicks. Some underwrite equipment for the beginner. There are a few contracts calling for a flat payment of 5 cents per head for raising the broiler with a split of the profits, if any. If a man can borrow money from his bank he

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Your New Holland Dealer is ready now to show you all the advanced features of this great new spreader. See him soon! The New Holland Machine Co., a subsidiary of The Sperry Rand Corp.

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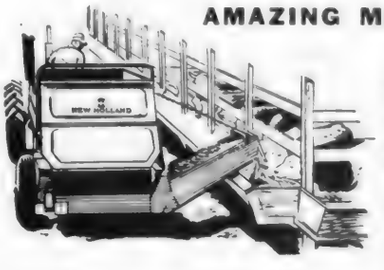

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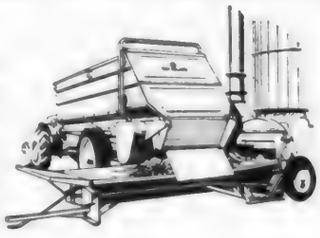
The new cross conveyor attachment automatically fills bunks for dry lot feeding in the winter . . . for green feeding in spring and summer. Discharge can be controlled from the tractor seat.



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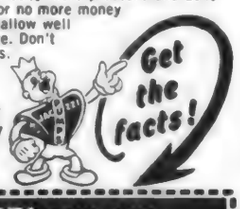

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finds himself ahead, for he is able to buy his chicks at one cent off and his feed at 25 cents discount on 100 pounds, a saving higher than the normal interest rate on loans.

But in spite of old-fashioned financing, disease, low markets, and stiff competition, the Arkansas industry is expanding. One grower has just completed a broiler house a quarter of a mile long. He won't estimate how many chicks this will house, but he feels sure that when he sells the broilers he will make himself some money. That's the Arkansas spirit.

Below is a breakdown of figures on a 3 pound broiler. The prices are typical of those prevailing last summer. The first line is the maximum, with chicks bought on credit at 13 cents, feed bought by the sack on credit at $4.65 per 100 lbs., and heat by propane at 5 cents per bird and the selling price at 26 cents per pound. The second line is an all-cash operation with chicks at 12 cents, feed in bulk at $4.15 per 100 lbs., and natural gas heat. The "overhead" of labor, medicine, interest, depreciation and miscellaneous is the same in both. Feed conversion is estimated at 36 lbs. of broiler for 100 lbs. of feed in both cases.

Cost of Chick	Cost of Feed	Heat	Labor, Interest, Medicine, Misc.	Total Cost per Bird	Selling Price @ 26c lb.	Net Profit per Bird
13c Credit	38.7c $4.65 100 lbs.	5c Propane	10c	66.7c	78c	11.3c
12c Cash	34.8c $4.15 100 lbs.	2c Natural Gas	10c	57.1c	78c	19.2c

GREAT MEN OF AGRICULTURE

Continued from page 43

Sorbonne in Paris where he could listen to the lectures and watch the experiments (but not do them himself) of Gay-Lussac, Thenard, Dulong, and the other pioneers in scientific chemistry who were carrying on the work started by the immortal Lavoisier.

After a year of study, Liebig himself was asked to read a paper before the National Academy on his analysis of fulminating silver—a black, crystaline explosive. After the lecture, an older man came to Liebig, complimented him on his talk, and invited him to dinner the following Sunday. Flattered, Liebig accepted. Sunday came and a most unhappy young chemist walked the streets of Paris—in his confusion he had forgotten to ask the man's name or his address. The following day a friend rushed up to ask. "What on earth did you mean by not coming to dine with von Humboldt yesterday? He invited Gay-Lussac and a number of other chemists to meet you."

Poor Liebig hurried off to call on Baron von Humboldt and apologize. When the

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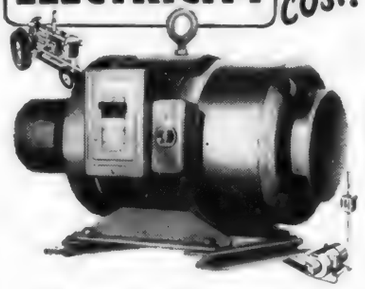

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All are quickly interchangeable, using same power unit as ROTO-CUTTER. (Prices are for attachment only; power unit alone costs just $175.50)

NEW 20" BRUSH SAW, makes vertical and horizontal cuts	$48.00
5 gal. ROTO ZEPHYR SPRAYER attachment	79.00
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ROTO-HOE model 300 is excellent for stirring poultry litter.

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Box 7 — Newbury, Ohio

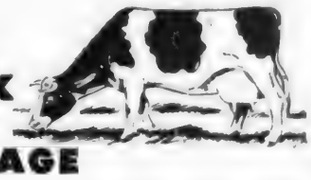
great naturalist and traveler heard Liebig's story, he was amused and arranged a second dinner. Liebig finally met Gay-Lussac, whose lectures he had attended, and the French chemist invited him to come and use his private laboratory. At last Liebig, a doctor of philosophy with a year's post graduate work in chemistry, for the first time was able to enter a laboratory and use the equipment.

Von Humboldt did not forget Liebig. A year after the near-disastrous dinner, he secured for him the post of Extraordinary Professor of Chemistry at the University of Giessen. Here, in this quiet country town, Liebig spent the next 28 years of his life teaching and carrying on the research which established him as the world's foremost chemist.

At Giessen, Liebig began a revolutionary method of teaching. Every student was permitted to work in the laboratory and each was encouraged to carry on original investigations. Liebig's lectures and demonstrations, put in book form by one of his students, formed the first text on qualitative analysis. This is a process by which a student or his professor could analyze a mineral, such as the greenish apatite, and find its chemical composition—in this case calcium and phosphorus. It was during this period that Liebig laid the groundwork for a new branch of his science, organic chemistry; discovered a great many new compounds including chloroform, chloral, and many of the cyanides, established the formula for uric acid, which decomposes into urea, and developed the theory of compound radicals—by which he explained how certain groups of elements (compounds) act as single elements in chemical combinations. He accomplished these things before he turned his attention directly to agriculture.

One of his American students of this period, E. N. Horsford, described Liebig: "He is perhaps two or three inches less than six feet, and stands quite erect, though a little rounding of the shoulders from much writing, labor and study. His figure is slender rather than stout, which makes him appear taller than he really is. There is an expression of thought in all his attitudes and movements . . . whether with the chalk and sponge or apparatus, it is all the same. He is all mind. He enters the laboratory, where he is surrounded by

make MILK from FORAGE



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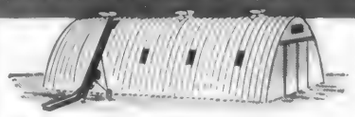

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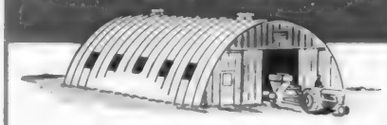

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POWERED
Farm Machines
"Carry the Load"
On Your Farm

Power TO FIT THE JOB — Power TO FIT THE MACHINE

Illustrated here are a few of the many farm equipment and service applications on which Wisconsin Engines are extensively used.

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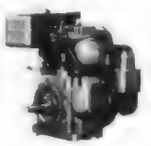

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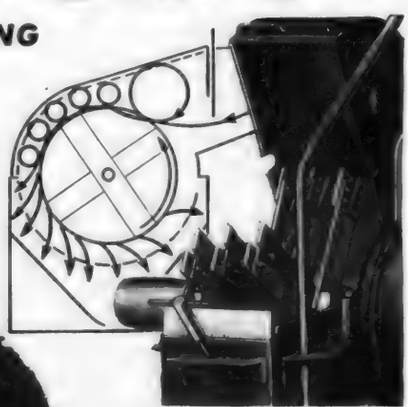

AMMER MILLS

gentlemen engaged in a great variety of investigations. He comes to a gentleman who has a new substance. The Professor directs him to bring a dozen test tubes, and perhaps an equal number of reagents. The unknown substance is in a few moments distributed among the test tubes awaiting the reactions. He goes on through the laboratory repeating similar experiments."

Giessen became the mecca for outstanding young men interested in chemistry. They came from every country to study under the master chemist who filled them with a great longing to discover chemical truths, inspired them to carry on heavy work loads, and sent them home to spread the knowledge and the teaching methods of Justus Liebig throughout the world. At Harvard, Yale, and other American colleges, Liebig's students headed the departments of chemistry. When Abraham Lincoln set up the United States Department of Agriculture, he appointed C. M. Wetherill, a Liebig student, as its first scientific employee. The Connecticut Agricultural Experiment Station, the first in the United States, was established through the efforts of S. W. Johnson, another graduate of Giessen. The influence of the clear, inquiring minds of these men was so great that, for a time, it became unthinkable to appoint anyone but a chemist as director of an experiment station.

One of Liebig's exploits in the field of criminology reveals the way the people had misapplied what little science was around. He was called to testify as an expert witness at the trial of a houseboy named Stauf who was accused of murdering and burning the body of his mistress, the Countess Gorlitz. The defense was the routine one that had been used successfully in a number of similar cases. The defendant claimed that the Countess, being a heavy drinker, had simply burst into flames through spontaneous combustion. Liebig's courtroom analysis of combustion destroyed once and for all this popular defense in murder cases. So impressive was Liebig on this occasion

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SECURITY LIGHTNING PROTECTION IN THE MODERN MANNER

that another witness, an architect named Kekule, was led to the study of chemistry and later discovered how six carbon atoms join together to form the benzene ring.

Chemistry and Agriculture

In 1837 the chemical section of the British Association for the Advancement of Science, of which Liebig was a member, requested that he prepare a report on the state of organic chemistry. This was a turning point for Liebig. It led him directly into agricultural chemistry, which consumed his energies for the rest of his life.

The first half of the report, which was published in 1840 under the title *The Chemistry of Agriculture and Physiology,* became one of the most famous and popular agricultural books ever published. Within eight years this book went through 17 editions in eight different languages.

In it Liebig presented the scientific findings on soils, plant growth, nutrient elements of plants, chemical composition of manure—and the cause of plant decay. He also killed and buried with characteristic, biting sarcasm the muddle-headed humus theory. The keystone of this theory was that plants absorbed carbon from humus and by means of a mystic, vital force of their own turned this carbon into the minerals they needed. Those followers of the humus theory who did recognize the need for minerals in the soil, felt they were stimulants rather than nutrients.

Liebig attacked the theory on several counts. First, he pointed out that humus is of variable composition so that when talking of humus, the theorists were not speaking of a uniform substance. Liebig showed through various calculations that there was far too little humus to account for the vegetables actually produced by the land. Then, through soil tests, he showed that after removing a crop of hay which should have taken much carbon from the soil—the soil is actually richer in carbon. "Plants get their carbon from the air," Liebig said. He dug out older researches, plus his own, to prove this. And finally he asked, "If plants get all of their food from humus, where did the first plant get its food—since humus is composed of decayed plants?" It is characteristic of Liebig that this attack on the humus theory was based on laboratory experiments rather than on field tests which could show that plants can grow without humus. Once having established the facts he needed through laboratory experiments, he usually left field testing to others.

In all of his testing of plant matter, Liebig found nitrogen present in every living cell. Since there wasn't enough decayed vegetable matter to supply all this nitrogen to every plant cell, Liebig concluded that plants must absorb nitrogen from the air just as they do carbon. When one considers that he was writing 50 years before the discovery that the legumes in cooperation with bacteria are able to take the nitrogen from the air, Liebig's guess was a shrewd one. He was also the earliest to uncover nature's way of showering nitrogen on vegetation.

Liebig and his students at Giessen collected hundreds of pounds of rain water, taking care to make collections only when the wind was blowing toward the town so that city smoke and dust would not contaminate it. After a great quantity of water had been distilled, they were able to obtain brownish-yellow crystals of sal-ammoniac, which is 26 per cent nitrogen. It was not yet known that lightning fixes a sizable amount of nitrogen during every thunderstorm by fusing oxygen and nitrogen into nitrate. Rainfall, containing this naturally fixed nitrate, was our original source of nitrogen fertilizer. Liebig, not knowing this, concluded that all the nitrogen he found in rain water resulted from ammonia produced by decaying plants.

Liebig and his students burned plants and from their ashes knew that minerals were definitely a part of plant make-up. Where did the minerals come from? He rejected the claim that the plant manufactured these minerals out of nothing but vital force. He studied the soil and the elements present in it; he analyzed the root structure of plants and the root etchings on limestone which gave him a clue to the chemical action of the root juices. He concluded that for plants to grow, the soil must have the necessary mineral elements present and in a form

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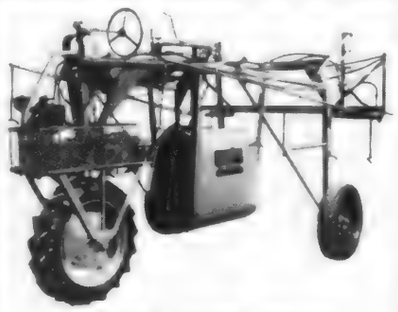

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available to plants; that the plants absorb these minerals in solution, and that the acid juice of the plant roots helps in making the minerals available. This was the great turn Liebig gave to agriculture. His genius lies in going one step further.

He pointed out that the slow weathering process which makes these minerals available to the plant could not keep up with the demand for minerals by succeeding crops and therefore it was necessary to return to the soil those essential elements which had been taken from it by the crop. All of which sounds like commonplace fertilizer talk today, but when Liebig wrote it in 1840 it was the most violently controversial assemblage of ideas to hit the scientific world.

In 1840, when the first edition of his report was published, Liebig was urging farmers to return to the land all animal and human wastes. He did not believe, however, that this was the only form in which fertility could be applied. "If we could procure elsewhere the substances which give to the manure their value in agriculture, we should not need the latter," he said. "It is quite indifferent for our purpose whether we supply the ammonia in the form of urine or in that of a salt derived from coal-tar: whether we derive the phosphate of lime from bones, apatite or fossils."

In 1845, Liebig began working on the problem of producing chemical fertilizers to supplement manure. He discovered a method for producing super-phosphate from bones by treating them with sulphuric acid—a system which is still used with rock phosphate. He also devised a method for recovering the nitrogen as a by-product from the manufacture of gas. In his laboratory, he mixed the first chemical fertilizer and went to the chemical plant personally, in his tall silk hat and frock coat. to see that it was produced exactly according to his specifications.

This time Liebig decided to test the product of his laboratories himself. He bought ten acres of the worst land he could find and had his gardener apply his chemical fertilizer along with manures in various combinations. The results were very disappointing. It took five years for him to discover that the one point he had insisted on and even seen to personally at the chemical plant—that the chemicals should be prepared in insoluble compounds so that there would be no leaching—was causing all of his trouble. In 1850 he read a paper by the Englishman, Thomas Way, which said that plant nutrients did not leach out of the soil nearly as rapidly as scientists had believed. Instantly he changed the chemicals into a soluble form, and his fertilizer performed very well. This was the birth of the chemical fertilizer industry.

Liebig then formulated the guide for fertilizer use—the law of the minimum.

The Law of the Minimum

This law is often quoted today just as Liebig stated it, though investigation has

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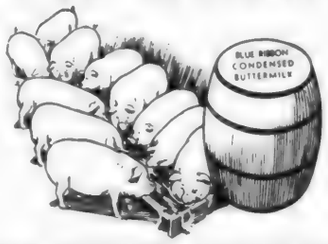

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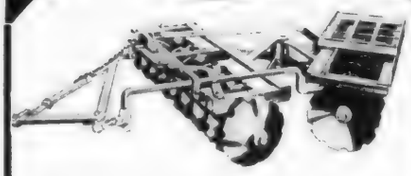

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shown that it is not as absolute as Liebig supposed. Briefly, the law states that the amount of yield depends on the growth factor which is available to the plant in relatively the smallest amount. For example, the yield of a crop grown on potash deficient land is limited by the amount of potash available to the crop even though there is an abundance of all of the other needed elements. At the time Liebig formulated this law, he predicted that the time would come when soil tests and fertilizer manufacture would permit farmers to know and to secure the exact fertilizer needed by their land and crops.

Liebig held that his patented manures, as they were called, should only be considered a supplement to the return to the land of animal wastes. In many of his "Familiar Letters," a newspaper series which he wrote to bring the findings of science to the layman, he emphasized the need to save all excrement and return it to the land if the fertility of the soil and the wealth of the nation was to be maintained. By spreading gypsum on his manure pile, he suggested, the farmer could prevent some of the loss of nitrogen.

London's sewage system which carried English fertility out to sea, deeply shocked Liebig. Regarding England's use of bone meal to replenish the soil with phosphates, he said, "England is robbing all other countries of the sources of their fertility. In her eagerness for bones, she has turned up the battlefields of Leipzig, of Waterloo, and of the Crimea; already from the catacombs of Sicily she has carried away the skeletons of generations. Annually her ships remove from other countries the manurial equivalent of three millions and a half of men while she takes from us the means of supporting them and squanders it down her sewers to the sea. Like a vampire, she hangs around the neck of Europe —nay, of the entire world! And sucks the heart blood from nations without a shadow of lasting advantage to herself."

At one time it seemed likely that Liebig would be invited to help the city of London devise a sewer system which would salvage the plant nutrients. He felt honored and very much challenged by this opportunity and was deeply disappointed when it did not materialize. It was, however, one of the few honors of life that

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was not given to the great chemist. During his life, he was made a member of most of the scientific societies of the world; he was made a Knight of the Hessian Order and of the Imperial Order of St. Ann, and, in 1845, the Grand Duke of Hesse conferred upon him the title of Baron and his name was changed to von Liebig.

These honors, however, did not interfere with the tremendous output of his work. In his analysis of protein, he isolated the first amino acid, tyrosine. He also interested himself in everyday matters and wrote articles on the way soup and meat should be cooked, he produced baking powder so that bread could be made without yeast, and he set up an industry for manufacturing a meat extract to be used in soup making.

With such energy that it might almost be called a vital force, he found time to carry on bitter, vitriolic quarrels with most of the great scientists of his time. Moulder of Holland, Gilbert and Lawes of England, Boussingault, Dumas and Pasteur of France were only a few who tilted with him. Some of these fights were personal, others helped clarify scientific principles.

A few years after receiving his patent of nobility, von Liebig left his beloved University of Giessen and became Professor of Chemistry at the University of Munich. Here he continued working on the problems of agricultural chemistry and publishing papers and books on the subject until his death on April 18, 1873.

In his last book written for farmers, von Liebig revealed one of the goals of his later life. "If I can impress the farmer with the principles of plant nutrition, soil fertility, and the causes of soil exhaustion, one of the tasks of my life will have been accomplished."

GRAIN SORGHUMS

(*Continued from page* 41)

dusty roads of the plains states this past summer and view the same scene over and over, fields of sorghum and corn standing side by side in the fierce, dehydrating glare, both undergoing terrific punishment. The corn was stunted and bushy at the top; the sorghum had curled its leaves tightly to check transpiration and hold every available drop of moisture it could get. It had gone "doormat," as one old-timer said. And always there was the same comment from the grower: "I'd rather have my sorghum than my neighbor's corn." Experience had proven that the grass was greener on the near side of the fence. If the corn would come through it might make 35 to 40 bushels to the acre. The sorghum was a much better bet to make it and would probably yield 50 bushels. The contrast in expected loan

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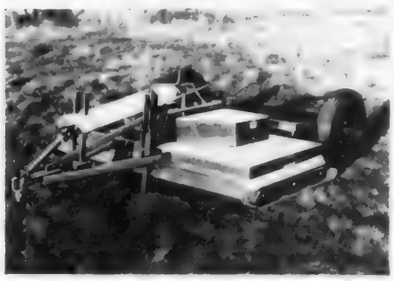
rates of $1.53 for corn to $1 for sorghum fades when the possibility of cashing in on either becomes a matter of survival.

The drouth conditions make it almost impossible to give any recommendations for the application of fertilizer to a sorghum crop just as they also exert great influence on the rate of seeding. Most growers in the Great Plains are very frugal in the use of fertilizer. Their lands are generally high in phosphate and potash so that the only supplement needed is nitrogen. This the experienced grower usually applies, if at all, after the crop has gotten started and he has a better idea of what the rainfall may be. If conditions are dry and look like they will continue that way, the nitrogen is skipped. If at the time of the last cultivation the farmer has reason to think his crop may get a good rain or two he may apply 30 to 60 pounds of N to the acre. With most growers this is still largely a matter of guesswork.

Irrigation is a new thing in much of the sorghum growing area and, as is to be expected, there is a division of opinion as to how valuable it will prove for sorghum. In the Texas Panhandle, however, where they have had experience with sorghum under irrigation, they know that water which goes to sorghum is never wasted.

Grain sorghums fit into the rotation just about like corn. Allington says, "Anything will do well after them in a rotation with the exception of oats: and even oats will do all right if you fertilize well."



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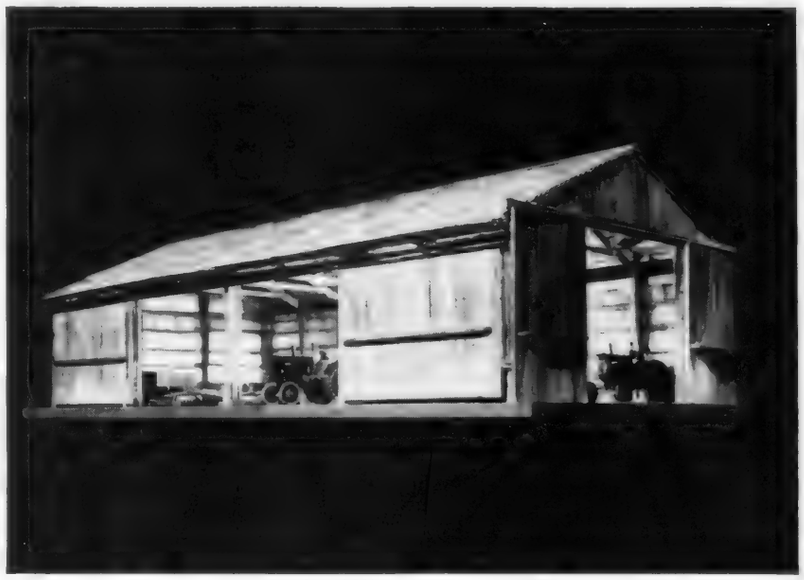

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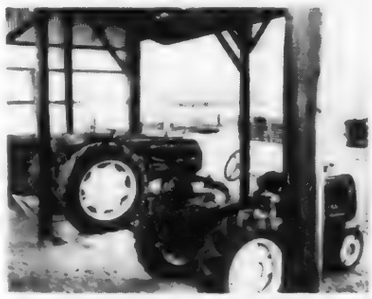

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In very dry sections sorghums do best following a season of fallow. In Nuckolls County, Nebraska, where sorghum is rapidly becoming a leading crop, a typical rotation might be two years of brome and sweet clover followed by two years of wheat, then a year of corn and a year of sorghum, or two years of sorghum if the corn is dropped.

Most farmers east of the Mississipi seem to have overlooked completely the importance of sorghums, particularly forage sorghums, as a catch crop or a second crop. Some good managers, cashing in on the crop's preference for a well warmed seedbed, will take off a cutting of hay late in May, turn under the stubble and plant sorghum. By late summer they cash in on a rich, heavy cutting of nutritious silage.

A First Class Feed

While the industrial uses of sorghum, the production of alcohol and starch to mention but two, have been in the news of late, the grain is primarily a feed crop. The old rule of thumb for the substitution of sorghum for corn has always been to use 100 bushels of sorghum in place of 90 bushels of corn. Many who have had experience with the grain, though, feel that a 1 to 1 substitution is acceptable, particularly if the grain is ground or rolled. Here again there are wide differences of opinion. Whereas Frank Allington always puts his sorghum through a ⅜ inch screen in a hammermill, Nels Sorensen, a Hardy, Nebraska, farmer who has had equally wide experience in growing and feeding the grain, feeds it whole. A big cattle-feeding operation at Amarillo, Texas, puts it through a roller. The rolling, they say, eliminates a lot of dust and a 7½ horsepower electric motor can do the job.

One point on which most feeders are more or less unanimous is the practice of staying with one variety. Each variety seems to have its own distinctive flavor and switching from one to the other invariably throws the animals off feed.

The New Hybrids

When the dwarf combine varieties of sorghum came along they were a big improvement over the taller growing types. They could probably be credited with keeping grain sorghum on the list of economic plants; for had it been impossible to harvest the crop in one operation with the combine, few farmers would have continued to bother with it. But dwarfing was only the beginning of the breeder's dream.

Those fellows are never content. They are a good deal like the man who is alleged to have crossed his homing pigeons with parrots so they could inquire the way when they got lost; they are always looking for new wrinkles. Sorghum is not too susceptible to diseases and insect pests in the drier areas of the Great Plains. Smut is bothersome at times, and in areas of high moisture, stalk rot and root rot will

cause some trouble. So the breeders decided to try to eliminate these hazards. Then, along with this they decided to shoot for higher yields coupled with early maturity and standibility. High yields and early maturity have been characteristics which seemed to be incompatible in the sorghum plant.

The success of corn hybrids, of course, was a spur to try the same with sorghum. But hybridizing sorghum is a problem of an entirely different complexion. The corn plant has a tassel and silk, two separate sex units. Each small sorghum flower, though, is a complete sex unit capable of self-fertilization. As William Ross, USDA plant breeder at the Fort Hays Experiment Station, Hays, Kansas, explains it, "The breeder had to find certain strains which can be made male sterile, use these plants for the female parent and cross them with others which make good males. The kafirs seem, in general, to make the best females and the milos are usually best to use for male parents. We can't say just what the first commercial hybrids will be, but it's a good bet that they will be a cross of Combine Kafir 60 with a milo type or derivative."

Ross explains the visual difference between the milos and the kafirs. Milo has a pendant oval head, the glume or hull has a ridge on it. It has a yellow midrib on the leaf and there is very little juice in the stalk. Kafir has a long head, its glume is smooth and the leaf has a green midrib. Most present commercial varieties have lost their identity as milos or kafirs.

To conduct his crossing experiments the breeder has plots in which rows of male sterile plants are grown alongside rows of normal plants with which they are to be crossed. At blooming time, the breeder

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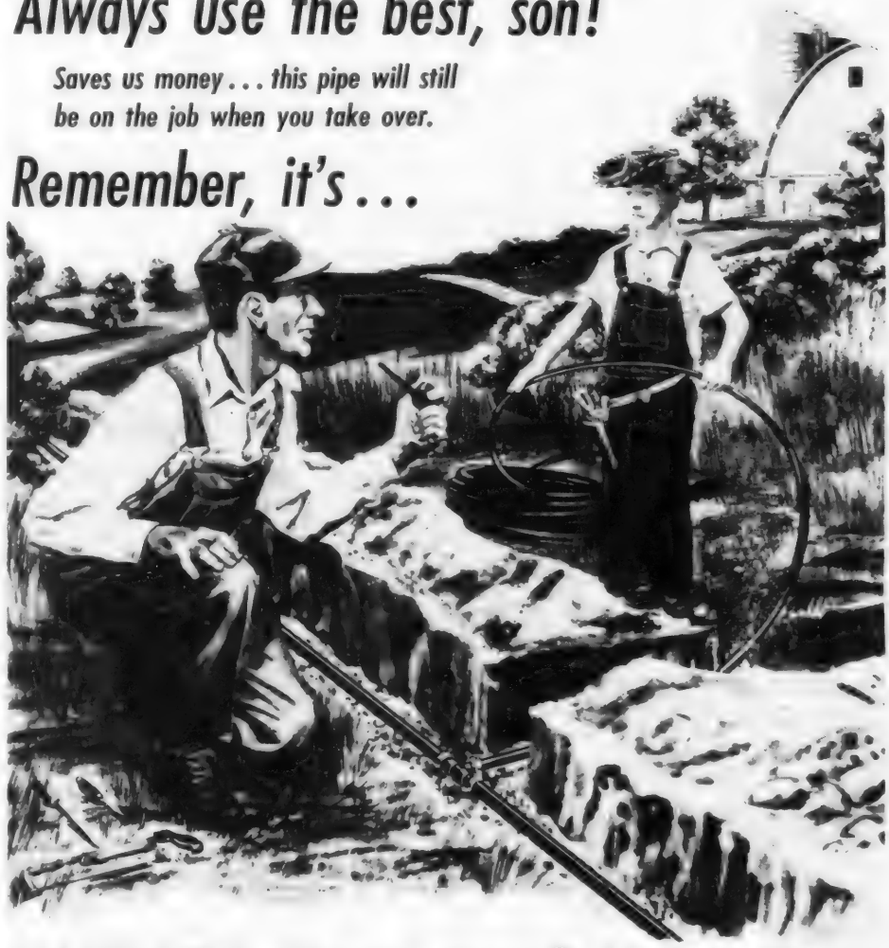

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walks through the plots early in the morning selecting heads from the normal male plants. He dusts them on the heads of selected male sterile plants to fertilize them, then immediately covers the fertilized head with a paper bag to protect it from the pollen of any other plant. After the seeds have set the bag is removed, the plant matures and the seed crop is harvested. The resulting offspring is then tested and compared with old line, standard varieties for yield, maturity, height, and all the other factors which are of physical and economic importance to the commercial grower. On a field scale, crossing is done naturally by wind in an isolated planting.

Simple as it may sound, this is a long and tedious process. Crosses which score high on one factor may break down completely on others or they may fail to breed true. And one of the most annoying obstacles to be overcome is getting both parents to bloom at the same time.

The people out in front at the present stage of the race for a commercial hybrid are the Chillicothe and Lubbock Substations of Texas Agricultural Experiment Station and The DeKalb Hybrid Seed Company. Under the direction of Richard Holland, a former staff member of the Chillicothe Substation, the DeKalb organization has come up with hybrids which they released this fall. J. Roy Quinby and J. C. Stephens of the Chillicothe Substation and N. W. Kramer at Lubbock had about 180 Texas seed growers producing seed of sorghum hybrids this year and will have large scale commercial seed production in 1956. They will have plenty of seed of hybrids for all who want it for the 1957 crop.

What will be the advantages of these new strains? They are expected to advance yields 20 to 40 per cent. The plants will be more vigorous when they first come up, will grow faster and have larger heads which will stick out well above the leaves, a distinct advantage for combining. Of particular advantage in Texas where the growing season is long will be the fact that the plants will have dry heads, that is, heads which will dry out while the rest of the plant is still green so dry grain can be combined from the green plant. They will be of the right height for combining, 24 to 30 inches for dry farming, up to 50 inches for irrigated land. It is hoped they will

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have greater stalk strength. Resistance to charcoal rot is a problem with which breeders are still wrestling. Charcoal rot is one of the most serious diseases which attacks sorghum. It goes to work in the stalk as the plant matures, causing the pith to dry out, disintegrate and lodge. The only defense against it is to breed resistance.

Yellow Grain

There is one more problem the breeders are trying to solve to make sorghum the perfect feed grain, and that is the introduction of a yellow endosperm. Sorghum grain from all present varieties is red or white and is lacking in vitamin A. To capture this vitamin and dress up the grain so that it is indistinguishable from corn in mixed feeds, the breeders are trying to capture the yellow color. Orrin Webster, USDA agronomist at Lincoln, Nebraska, has done much of the work on this project. He found a yellow endosperm variety of sorghum in Nigeria, West Africa, a few years ago and more recently came across one from the Anglo-Egyptian Sudan. R. E. Karper at the Lubbock Station in Texas obtained another yellow endosperm type from Tanganyika. The trouble is, these African varieties are tall growing and late maturing and it is very difficult to transfer their yellow characteristic to commercial American varieties without seriously affecting the factors for shortness and earliness. Webster feels certain, though, that the sorghum of the future will be yellow.

Plant breeders worked out a special technique to cross sorghum with Johnsongrass. The flowering head of the sorghum is encased in a rubber tube. Hot water is poured into the tube to destroy the pollen, then Johnsongrass pollen is dusted on the head.

Forage sorghums are coming in for the hybrid treatment, too. The object here is not primarily to increase yields, which are quite satisfactory, but to develop a better way to produce seed. The object is to grow a short female plant from which seed can be combined.

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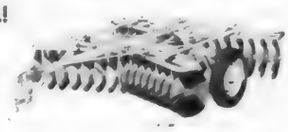

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Yet another project is the attempt to breed sweetness into the stalks of some of the unpalatable types of grain sorghums. This could be something of a mixed blessing, because high stubble is good for a field. Farmers in the semi-arid regions often point out fields with crops which seem to be doing so much better than those just across the fence. "There was sorghum stubble there last winter and it held the snow," they say. "Cattle won't graze sorghum stubble like they will corn stubble. That extra moisture is really showing now." Midland, Combine Kafir-60 and Redbine-66 are exceptions to this rule as cattle seem to find them very palatable.

To produce a super forage crop for the south, plant breeders are working on an experiment which should ultimately produce the mule of the plant world, a sorghum-Johnsongrass cross. The

The hybrid plant on the right, contrasted with the standard variety (left), is one in which the breeders have developed better and more uniform stooling. This characteristic will be a potent factor in increasing yields.

idea behind this project is to combine the potent feed values of the sorghum with the persistent perennial habits of Johnsongrass. The work has been handicapped by the fact that Johnsongrass has twice as many chromosomes as sorghum (chromosomes are the microscopic cell bodies which carry the genes which, in turn, are the determiners of inheritance). But the breeders have finally come up with an experimental type in Mississippi which has produced 32 tons of forage per year each of the last four years.

These crosses are not yet ready for release. The expectation is that when they are perfected they will provide abundant silage and excellent grazing, supporting up to 8 cows per acre during the very hottest of the summer months.

Future Prospects

With certain qualifications based upon the influence of the more humid climate many observers expect to see the new sorghum hybrids immediately begin an eastward advance. They say the sorghums will insure a more stable supply of feed grains in dry years and they are more resistant than corn to chinch bugs, grasshopper and rootworm attacks. These are powerful arguments in their favor. They are bolstered by the fact that the Chicago Board of Trade recognized the importance of the grain when it established trading in sorghum futures in 1951 and by the high volume of exports they have enjoyed. If breeders can ever build into them the same ability to go "doormat" in periods of economic drouth that is their virtue in times of physical stress they will be the answer to at least one of the farmer's prayers.

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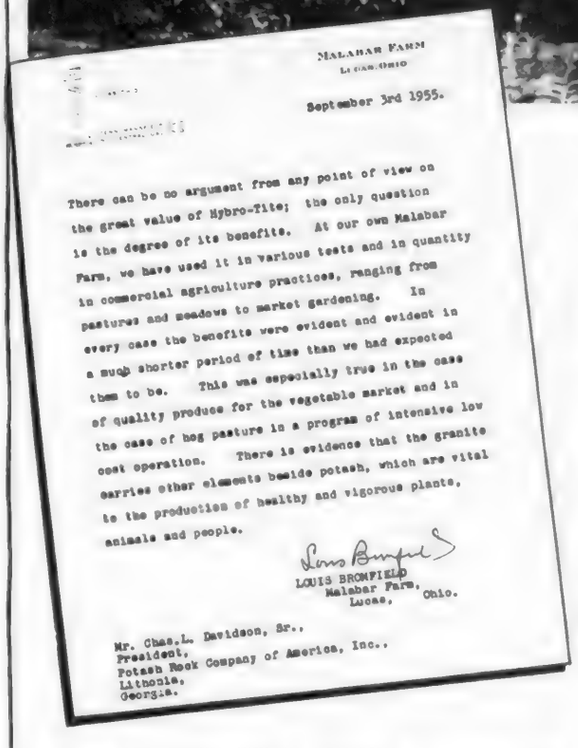

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Mr. Louis Bromfield (center) shows Mr. Charles L. Davidson and Mr. H. V. Alexander one of Malabar Farm's flourishing corn fields on which Hybro-Tite was used.

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THESE STATE FARMERS' MARKETS SURE MAKE IT EASY FOR THE AVERAGE FLORIDA FARMER TO MARKET HIS CROPS. IMAGINE, THERE ARE 20 OF THEM AROUND THE STATE.
YES, AND THE FARMERS GET PAID IN CASH RIGHT ON THE SPOT, TOO.
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THE SCALE IS MIGHTIER THAN THE EYE

(Continued from page 31)

son of performances of home tested stock is meaningless. To say that Tom Jones' bull which gained 2.85 pounds a day while on feed on the ranch is a better sire prospect than Sam Smith's bull, which gained only 2.25 pounds a day on test on the Smith Ranch, is all wrong. There was no similarity between the conditions under which the two tests were conducted. After all, the object of the tests is not to put Jones in competition with Smith, but to help each of them to discover their better stock. Jones' 2.85 bull is certainly a better sire prospect than his 1.90 bull and Smith's 2.25 bull is a better bet than one which gained only 1.80 pounds a day.

There are those who contend that this "splitting hairs" about a difference of a quarter of a pound to a pound or so a day in gains is trivial. Men like C. H. Codding and Sons, out in Foraker, Oklahoma, say such people haven't mastered applied arithmetic. The Coddings weigh their cattle at weaning and again after a feeding test and cull accordingly. In dollars and cents their results have been something more than statistically significant. Last year they sold a carload of Hereford calves within $3.50 per head of the top load of feeder calves at the American Royal and have been getting a 2 to 4 per cent premium on all their calves year after year.

The Codding testing program costs about an extra dollar a head in labor but they are convinced every one of these dollars produces an additional $10 profit.

Ohio's Charles Haigler and his son Robert, who have tested 452 head of cattle on their farms near Washington Court House during the past five years, have records to show that their bull calves now gain 81 pounds more and their heifers 48 pounds more on 140-day test than did their forebearers back in 1950.

Burly J. P. Smith, of PanTech Farms, puts it this way: "Testing means an extra ten-dollar bill on every weaning calf: an extra twenty dollars on yearlings. If a man who sells fifty calves a year raises his average weaning weights in the course of a few years from four hundred to four hundred and fifty pounds, that's an extra ton and a quarter of beef he's getting from the same sized cow herd. At twenty cents a pounds that's a gain of five hundred dollars. Splitting hairs?

"Besides that, we get a premium on cattle from performance tested herds. Our ranchers have had inquiries for ten thousand head of cattle more than they could supply this year at a two-cent premium. For the last three years we have been selling the bulls that have been on test at the PanTech Farm at the conclusion of the test. Last April our bulls averaged four hundred and forty dollars, forty dol-

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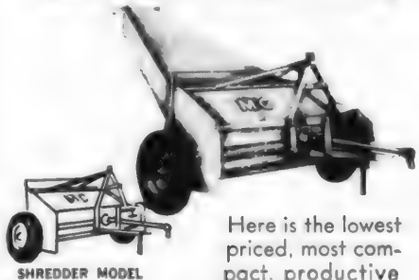

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lars a head more than those at the local purebred sale."

A breakdown of the figures shows the buyers, operators of big purebred and commercial cattle outfits, paid an extra $2.14 per pound for each 25 pounds above the average gained by the better bulls. The 75 bulls in the sale ranged in price from $155 to $1200. The influence of gainability on the buyers' enthusiasm is illustrated by a comparison of the prices brought by two bulls both of which graded high choice. Bull number 21-3, which had gained 2.99 pounds per day brought $1050, while bull number 23-2, which had gained only 2.16 pounds per day sold for $350. The top gainer, a bull with a record of 3.34 pounds per day and a grade of good, brought $1000. None of these bulls were highly fitted. They all had enough "manure on their knees" to go into service the day they hit their new homes.

Performance Registry Association

The demand for performance tested cattle has been so great in the Panhandle area that a number of the ranchers there have finally set up an association to certify to the records of tested herds. This is the new American Beef Cattle Performance Registry Association, with headquarters at Canyon, Texas. Colby Conkwright, a rancher of Hereford, Texas, with both purebred and commercial Hereford herds, is the first president of the organization: Dr. M. R. Calliham of West Texas State College at Canyon, is the Executive Secretary.

Among its objectives the new association (it started registering cattle of all beef breeds in October) lists the following:

a) To officially record the performance and production of tested animals registered with various beef breed associations;

b) To encourage accurate measurement of the performance and production of beef cattle;

c) To promote the improvement of beef cattle in the economical production of high quality meat;

d) To cooperate with the various breed associations in the promotion of better beef cattle; and

e) To encourage the use of breeding stock with *proven* high gaining ability in both registered and commercial herds and help establish markets for the produce from such herds.

The Association has no quarrel with any of the old line breed associations. Every one of the directors raises and takes pride in his purebred cattle. They feel they are simply offering an added and most important tool for the selection of better beef animals. The great demand for performance tested cattle is bringing forth numbers of spurious offerings from herds

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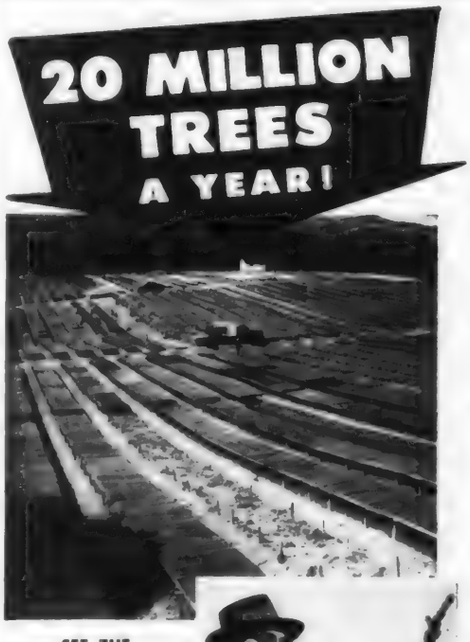

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that have never seen a scale. Dissatisfaction with such cattle on the part of feeders could set the program back years and the Texas organizers and their fellow producers in other states are determined to halt the practice before it gets a good start. By standardizing and supervising procedures for farm and ranch testing they intend to bring the benefits of the program to the mass of beef producers.

Conformation

Finally, just a word about conformation. The chief argument of those who are suspicious of the value of performance testing is that it ignores conformation and quality. A radical like Tom Lasater (see story on page 32) answers that with a question—What is quality? The more conservative advocates of testing see no conflict at all. The Kentucky station, for example, like others working with performance testing, records conformation scores on all individuals entered in the test both at the beginning and at the end of the period. True, the individual with the best conformation is not necessarily the best gainer. The eye alone is an entirely unreliable judge of gaining ability. But the tests have proven, particularly those at Fort Reno, Oklahoma, that there is no conflict between the accepted standards of conformation and gaining ability.

Colby Conkwright's herds are proof of this. A few years back he started aiming for a comprest type of cattle to get some outstanding club calves. He finally got exactly the kind of heifers he wanted, and low gaining cattle along with them. That was the end of comprest cattle on the C-Bar Ranch. When performance testing was started at PanTech he became one of the original co-operators and has been using performance tested bulls in his herds ever since. He has been careful to select for type as well as weight and now has some of the finest looking, fastest gaining cattle in the Panhandle.

Of one carload of top calves which the Coddings sold last year 13 were shown as club calves in Menard County, Illinois, this summer. Nine of them finished among the top 10 of the show. One of these was shown at fairs in adjoining counties and was top calf in four out of five shows and second at the Illinois State Fair.

A respected cattle judge consulted by the association founders in setting up their standards advised them, "If you select for beef production you'll get the type you need. If you select for type you may not get production." There seems to be no rebuttal to that.

The Texas Panhandle boasts a football team known as the Golden Sandstorm. It may well be that another Golden Sandstorm has sprung up on the plains to lift cattlemen throughout the nation to new levels of efficiency and profit.

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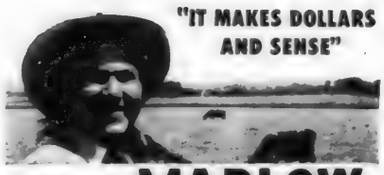

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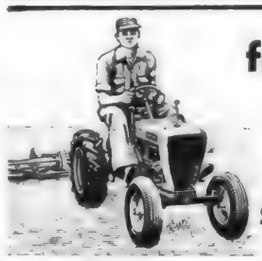

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(*Continued from page* 51)

ing. Fairly wide row and plant spacings are used. This system is recommended for heavy yielding dewberries and other trailing varieties.

The patch system is no system at all. When suckers are left to develop freely, the result is a dense thicket with small berries, rampant disease and impossible picking conditions.

The First Season

Cultivation begins as soon as the plants are set, both for control of weeds and to conserve moisture. Moisture is the big factor in berry size and yield. Cultivation must be frequent throughout the first season, unless a cover crop is planted between the rows in the late summer or early fall. Cultivating too late in the fall encourages late growth that often causes winter injury. A cover crop checks growth of the canes in autumn, allowing them to harden before winter. Kirschman prefers rye as a cover crop, which is reworked into the soil while still green the following spring. Oats, crimson clover and buckwheat can also be used. "You never want to broadcast the cover crop," says Kirschman, "or it will give you trouble within the rows. Use a drill in sowing the cover crop. And don't plow under the cover crop the next year because plowing too easily prunes bush roots. A disc is best for subduing the cover crop without deep disturbance of the soil. In fact, a disc is the best tool to keep cultivation from being too deep any time. Brambles, especially, are very shallow rooted and two inches is deep enough to stir the soil. But it's a good notion to change cultivating tools now and then, using a spring tooth harrow, for example, to keep from getting a plowsole that can easily be caused from using the same tool at the same depth time and time again. Garden tractors with rotary blades must be handled carefully for they go in deep enough to cut the roots before you know it. You can expect to do quite a lot of hand hoeing near the plants to keep weeds and suckers down."

Weed killers, particularly Crag Herbicide, are proving effective in bramble plantings for the control of foxtail, crabgrass, and other annuals. Generally, weed killers are for pre-emergence use, with the ground clean-cultivated before the spray is applied. Diesel or fuel oil at the rate of 30 gallons of oil to 70 gallons of water is used by some growers as a weed killer. Mulching, for both weed and moisture control, is more often used by part-time berry growers and home gardeners. It has the bad feature of drawing field mice, which destroy the plants themselves, though use of poisoned baits can frequently offset this disadvantage. Mulching, once started, must be continued, for it causes plant roots to lie even closer to the surface than normally, making later cultivation difficult.

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However, for weed control and moisture retention there's no practice better than mulching, which is growing in popularity.

The use of commercial fertilizer in berry growing is not widespread. Response of berries to manufactured nutrients other than nitrogen is uncertain. Fruits grown on soil of average fertility need nitogen more frequently than any other plant food. Some growers like to fertilize each plant with a handful of ammonium sulphate or a similar nitrogen carrier a month after setting plants and each spring thereafter. Too large an application will damage roots if the soil is too dry. In general, berry specialists recommend that the best fertilizer is barnyard manure, heavily applied to the ground before the berries are planted.

Pruning, A Rough Job

Bertha Kirschman works in the vegetables and berries along with her husband, their grown son, and a steady hired hand. About 20 pickers are added during the three-week berry harvest. Bertha doesn't see any easy money in berries. "At picking and pruning time," she says, "your arms are ready to drop off at the end of the day, but there's always another day facing you. Even on a hot July day, if you don't want to be all scratched up, you wear heavy clothes, and high leather boots are a good idea, too; but you still wind up a mass of scratches. There're a few hybrids without thorns, like the thornless boysenberry, but yields are less certain."

Pruning, while hard work, is not hard to master. The growth habits of all brambles are similar. Their roots are perennial, sending up a new crop of canes each year, which bear fruit the following summer and then die. Pruning consists of removal of canes which have fruited and cutting back of the new canes. Use of a pruning hook saves considerable bending over and lessens scratches from thorns.

Pruning practices vary with different varieties of berries and with local custom. In some sections, old canes are removed and burned soon after harvest to reduce diseases, while in other sections the old canes are not removed until time permits during the late winter, since the old canes offer protection from snow breakage to the new canes. Here are the basic methods of pruning new growth:

Black and purple raspberries and blackberries: Before growth starts in spring, cut out weak and broken new canes and thin the rest to stand about 8 inches in the row (for blackberries), or if in hills, thin to 4 or 5 of the healthiest canes per hill. Side branches should be cut back to 12 or 18 inches in length. Unbranched canes should be headed to about 4 feet in length. In June, the new shoots of the current season's growth of black raspberries should be pinched back to 18 inches, which creates more compact bushes.

Red and everbearing raspberries: These

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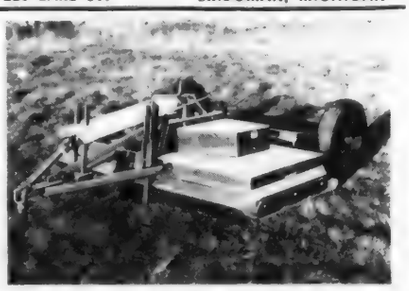

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should not be summer pruned. Dormant pruning, before buds swell in the spring, consists of thinning out weak canes, leaving those of ½ inch or more in diameter, spaced about 6 inches apart. Canes under 24 inches in height are removed. All canes are headed at 5 or 5½ feet at this time.

Dewberries and trailing blackberries: Boysenberries and loganberries along with dewberries, are the best known of the trailing types of brambles. All need support. The bearing canes are trained to trellises, while the new shoots are left trailing on the ground, usually stretched in one direction parallel with the row for easier cultivation. When well grown, these trailing new canes are bunched together and held in place by stakes or by U-shaped wires pushed in the ground, and are left prostrate over the winter, sometimes being covered with dirt for greater protection. In early spring, the old canes are cut off the trellises and the new canes are tied or looped over the wires, after being headed back to 3 feet for dewberries and from 4 to 12 feet for other kinds, according to habits of growth and spacings of plants in the row.

Currants and gooseberries: Dormant pruning, after the first season's growth, consists of thinning to 6 or 8 strong shoots. At the end of the second year, 3 or 4 one-year shoots, and 4 or 5 two-year-old shoots should be left. In later years, 3 or 4 each of one, two and three-year shoots are allowed to remain and all older canes removed. As with all brambles, the age of canes is quickly recognized by coloring as well as by growth rings.

Because certain varieties of currants and gooseberries are host to blister rust, a serious disease of white pine trees, a number of states do not permit the planting of currants and gooseberries, while other states permit them under special authority only in certain areas. Local regulations, if any, can be learned from the county agent.

The Payoff

Income from commercial berry plantations differs widely. In California, with large yields of large-sized berries, gross incomes of $4000 per acre are not uncommon. In berry enterprises in other parts of the country, with most all labor hired, a net management income of $100 per acre is considered good. Labor costs vary just as widely. In New Jersey, typical picking costs are 8 cents a pint for blackberries and raspberries, with a bonus of one cent a pint at the end of the harvest for steady workers. An average worker picks about 100 pints a day.

The labor problem in most areas is acute. Chris Kirschman's problem is typical. He feels the labor squeeze more each year. He says, "Don't forget, if you are in berry country, everyone else's berries are ready to harvest when yours are. That

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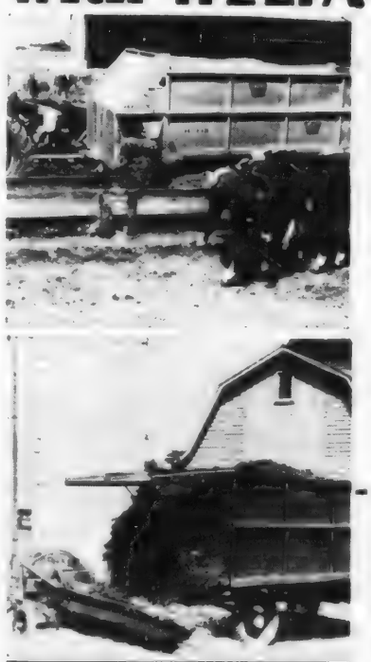

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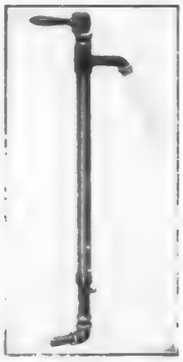
means competition for available labor. In some places hiring on a piece work basis is out. Labor laws and minimum wage scales often make hiring of vacationing school children a losing proposition for the grower. It's a good idea to count the size of your family before you plant too many acres of berries. Berry growing to make money must be a family affair."

Specialized sales bring the greatest profits. The past year, Kirschman's raspberries sold on the Newark market for around 25 cents a pint wholesale. For placing a fresh green leaf on the pint cups and covering them with cellophane, at a cost of less than one cent, the New York City market at times paid 30 cents a pint wholesale. Some of Kirschman's blackberries and red or black raspberries, sold through roadside stands to vacationers in the summer resort colonies which dot the Raritan Bay shore, have been bringing from 35 to 50 cents a pint retail. Kirschman has found that yellow and purple raspberries are poor sellers. Their tartness and color lessen their dessert appeal for most people.

It is not always the biggest crop that makes the best profits. Marketing ideas sometimes cause average crops to be the biggest money makers. H. F. Winter of Wayne County, Ohio, stores the major part of his berry crop in a nearby locker freezer plant in 25 pound cartons. Costs run one half cent a pound a month. These berries sell out of season to bakeries at a high premium. J. E. Moulton of East Lansing, Michigan, likes a practice of pruning which can also bring out-of-season profits. Everbearing varieties, which usually bear two light crops, one in summer and another in fall, are pruned drastically in the spring. This eliminates the summer crop but causes heavy fall yields, bringing better prices at a time when few berries are on the market. Nelson E. Cooke of Branford, Connecticut, sells his produce in a number of forms. He not only sells fresh berries, but processes them into ice cream and into fruit drinks for sale at a roadside combination fruit stand and snack bar.



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The exclusive slip-clutch blade control with adjustable tension of the Brillion Rotary Shredder enables you to utilize the full power of your tractor without danger to gears and drives. It smooths out the jolts of shredding rank stubble, heavy cotton and corn stalks, orchard prunings, of cleaning out brush.

Trash is quickly reduced to fluffy, short length material in a cyclone of whirling steel. Ground is easy to disc and plow, often with fewer discings.

The suction action of the tilted lower blades raises lodged and down stalks for cleaner shredding on the first pass.

The Brillion Cut-All Rotary Shredder has two sets of two blades. Each set is independently controlled through the friction slip clutch. If a stone, stump, or wire stops one set, the other keeps cutting.

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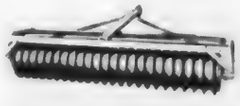

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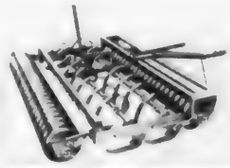
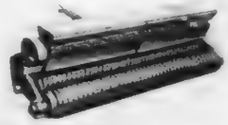


BRILLION PULVI-MULCHERS crush both surface and buried lumps in one trip. Completely prepare seedbed for planting. Dust sealed roller bearings. 6-, 7-, 8-, 9-, and 10-foot.



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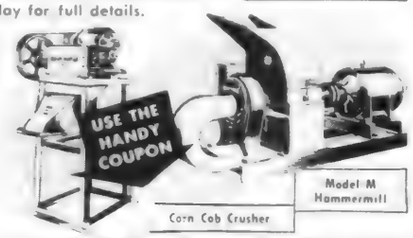

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NATURE'S FLY TRAP

(*Continued from page 36*)

He slides into the treacherous liquid, soon perishes, and his body is digested.

A number of varieties of pitcher plants are cultivated in greenhouses, among them the Purple-Trumpet.

Throughout the southern lowlands are the more common species such as the large Golden-Trumpet, *Sarracenia flava,* which has huge orange-yellow blossoms in the spring; the Yellow-Trumpet, *Sarracenia sledgei,* which has slender purple-veined trumpets and yellow blossoms; the Dwarf Pitcher-Plant, *Sarracenia minor,* which seldom grows a foot high; and the Parrot Pitcher-Plant, *Sarracenia psittacina,* which is a purple-flowered species with fiddle-head trumpets. The small fiddle-head trumpets of the Parrot Pitcher-Plant stand in rosettes among the stems of other bog plants, and from their midst rise short stalks bearing striking purple flowers.

The northern states do not have as many species of pitcher-plants, but the delightful species *Sarracenia purpurea,* which goes under a number of local names such as the Huntsman's Cup, Side-Saddle Flower, Indian Cup and Purple-Pitcher is a common denizen of bogs and low meadows of the northern states. The blossoms resemble the flowers of the Parrot Pitcher-Plant, but it does not grow as tall and the trumpets are shorter. The northern species does not bloom until May or June.

Collecting and potting the plant is a simple process if a few precautions are observed. First, a plant should not be transplanted when it is in full bloom, for much of the energy has gone into manufacturing bloom and seed. During the months of May or June select the most vigorous blooming plant, mark it by tying a white string around the stalk, and, in July or August, when the stalk has turned brown, dig it up carefully, allowing plenty of muck to adhere to the roots. Take home a quantity of sphagnum moss which usually grows nearby and transfer it to an eight-inch flower pot. Place the pot in a pan of water and keep water in it all of the time. Do not let it become overheated during the winter months by placing it near a radiator. The best place would be in a sunny window away from heat.

These bewitching plants can be grown in the yard or garden. However, only the northern species is hardy enough to stand much frost. To plant in the garden, follow the same rules for transferring to a flower pot, but add considerably more sphagnum moss and water well for the first three or four weeks. It will soon adapt itself to its new home and will amaze your guests. It will also pay for your kindness and attention by keeping your home free of stray insects.

THE AUTHOR: M. H. Berry has combined two careers very profitably. He is professor of botany and chairman of the science division of West Liberty State College, near Wheeling, W. Va., and he writes and illustrates articles on natural history subjects and writes and illustrates a column on botanical subjects for newspapers. He is a native Kentuckian and has degrees from Peabody College and Columbia University.

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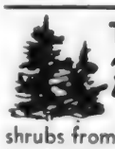

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HOG FARM GROSSES $250,000

(*Continued from page* 56)

culling are used as replacements for the six home herds and as replacements and foundation stock for the farmer-producers.

Producing the Hybrid

Each farmer-producer is limited to the combining of two inbred breeds to produce one commercial line. All of his parent stock comes from Conner Prairie and the rigid standards of selection also come from there. Conner Prairie fieldmen visit the farm about once every two weeks to keep an eye on the work being done and to make selections of animals that will go to the customer. As at the home farm, litters of less than eight pigs are eliminated at farrowing. The pigs are weighed at birth, at weaning time, and at 154 days of age and any pig that fails to make 154 pounds at 154 days is automatically eliminated.

At the time of selection, all animals have been given their cholera shots and had blood samples taken for brucellosis tests (all breeding stock at Conner Prairie and on the producer-farmer farms is blood tested before each breeding). The culls remain on the farm for fattening for market; the boars and gilts selected for sale as breeding stock are shipped to Conner Prairie where they are unloaded in the area set aside for transient stock. As a sanitary measure, the transient area is separate from the breeding area on the farm. Different equipment and personnel are used and animals are never transferred from the transient group into the breeding herd.

Here, the animals are sprayed for mange and lice and are given a cadmium oxide worming mixture. Each animal is again individually checked for possible defects and selections are made from the group for the customer. Before shipment to the customer a performance certificate is made on the individual. This shows the vital information on him, such as farrowing date, number of pigs in his litter, number of teat spots, weight at 154 days, etc. The certificate also carries the three-year testing averages for every animal in the Conner Prairie breeding herd for both lines of his genetic make-up as well as the carcass data on the litter mate of his sire and dam. In the past, this testing data,

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which includes number of pigs born, number weaned, 56-day litter and individual weights, 154 day weight, and feed per 100 pound gain, was given for only the individual sire and dam of the boar or gilt being sold. In keeping with the concept that they are dealing with group genetics, however, Bubenzer now gives this information for the entire herd of each of the parent lines.

Shipping the stock from the producer-farmer and to the customer is done in one of three trucks which were designed according to scale models constructed by Don Fisher. The special bodies on the trucks confine each animal in an individual pen and permit loading or unloading any hog in any position in the truck without disturbing the others.

In general, the business arrangement with the farmer-producer is this: The producer-farmer is selected because he is considered a good hog man who has maintained a disease-free record with his own herd. Breeding stock is supplied him by Conner Prairie, but he must pay a deposit on each sow or gilt he gets from them. If the sow dies from any cause except cholera, the deposit is forfeited. Conner Prairie guarantees her against cholera and also guarantees that she will produce young. At the end of her useful life, Conner Prairie sends her to market and the deposit is either refunded or used for another sow.

The boar is Conner Prairie's responsibility. No deposit is made on him by the farmer and Conner Prairie loses if he dies or is killed. "We had one farmer who put a young boar in with an older animal and got him killed the first day he was on the farm." Don Fisher said. "That was just our tough luck."

The producer-farmer agrees to sell breeding stock *only* to Conner Prairie and to sell all culls for slaughter. He also agrees to ear notch and keep the required records on every animal and to abide by the testing and culling which is part of the program.

Conner Prairie, on its part, agrees to buy those animals for commercial breeding stock which pass their inspection and for which there is a market. They also agree to pay a premium for these animals. In order to sharpen the eye of the producer-farmer for finding defects, they agree to pay a smaller premium for any animal found to be defective between the 154-day selection and the time of shipping, but to dock him the shipping charges for any such animal discovered after it reaches the farm for assignment to the customer.

All of the culls are the property of the farmer. This is an important item to many of them. As one producer-farmer put it, "One of the things that attracted me to the program is that it put me in the meat-type hog business with a very small investment. I find that the hybrid pigs I feed out more than pay for the

IMPORTANT MESSAGE

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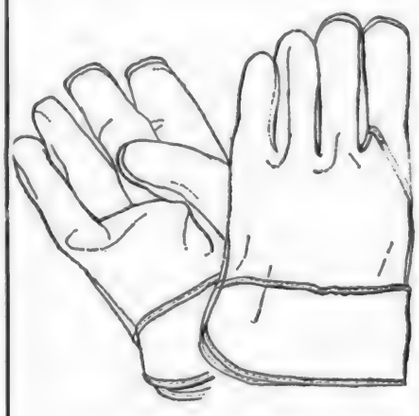

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extra time I spend ear notching and keeping records and managing the herd the way you have to. And besides that, I get the premium on about half my boars and gilts."

The Sales Pitch

Two or three of the farmer-producers were purebred men before they changed over and enjoy the detail work and care that goes into raising a registered herd, but hate the job of selling the animals they produce. For them, this system is ideal, for Conner Prairie, with its industrial approach, has separated sales from production and has built up a special sales force to handle this end of the business.

Heading the sales force under Bubenzer is Emory Sharp, a handsome, affable man in his mid-forties, who has the salesman's knack of winning friends and influencing people and the managerial ability to organize and run a rather extensive sales force. Most of the country he reaches through advertising and direct mail selling, but in the hog belt, Ohio, Indiana, Illinois, and Iowa, he has individual salesmen. Working with and under these area salesmen are about 100 part-time farmer-salesmen.

As it works out, the contact and actual sale is usually made by the farmer salesman among his neighbors. The area man then services the sale. He explains to the farmer the breeding procedure which Conner Prairie recommends with the use of their boars. Briefly, this is to select gilts from the most productive sows the farmer owns and breed them to the Conner

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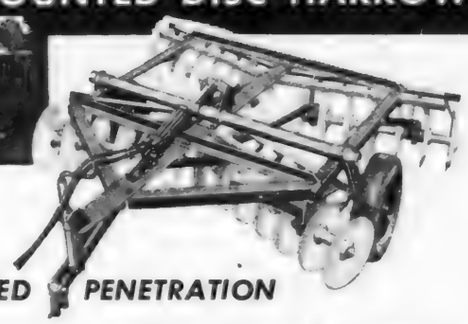

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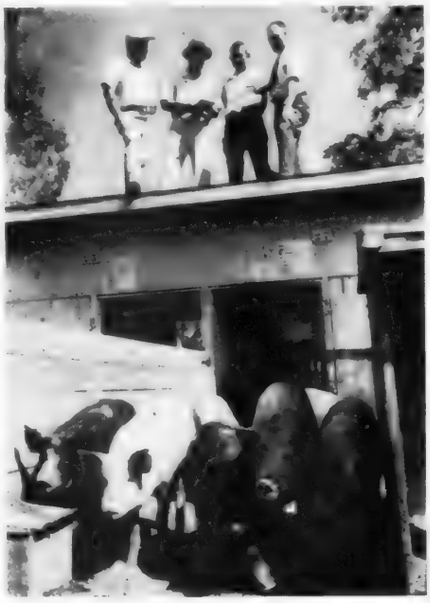
Prairie boar which gives them the best out-cross. The number of pigs born to each gilt are recorded. All pigs from this first breeding, gilts as well as barrows, are fed out and the sows rebred to the same boar. This second batch of pigs are ear-notched and the gilts from the most productive sows kept for herd replacement (by this time the farmer has two litters on which to judge the sow) and the rest



Salesmanager Emory Sharp (second from left) shows testing pens to Illinois farmers.

fattened for market. Again the sow is bred back to the same boar and this time the sows as well as the gilts and barrows are fattened and shipped. Then a new boar is purchased and the whole cycle started again with the gilts which were saved from the second breeding.

Besides explaining the system, the area man also swaps ideas with the buyer about hog raising. This last is no small item, for Bubenzer has an almost uncontrollable enthusiasm for trying out new ideas, evaluating them economically, and broadcasting the results. Salesmen can pass on the Conner Prairie experience with such things as the Yetter hog crate, which fastens to a three point tractor hitch and is a time saver for catching pigs and transporting them; the Sterling fence post setter, which runs off the tractor hydraulic system and pushes steel posts into the ground or pulls them out with such ease that one of the men said, "You can put in fence posts at the rate of one a minute all day and still go home and be civil to your wife"; the simple steel post and two-by-four arrangement that converts two posts into a corner post that will support 40 rods of fence; the excellent results they have had with their anemia paste; or steer them away from such costly experiments as raising pigs on wire like turkeys, which Conner Prairie tried and gave up.

But these are the trimmings, helpful

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Economical. Easily applied.
Cattle Size—$13.00 for 500
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1" numbers, both sides. Complete cow set: brass tag 2⅜ x 2½", 40" chain, and attachment link. Per set—dozen lots—$1.50 each. F.O.B. Newport.

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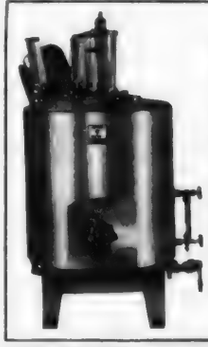

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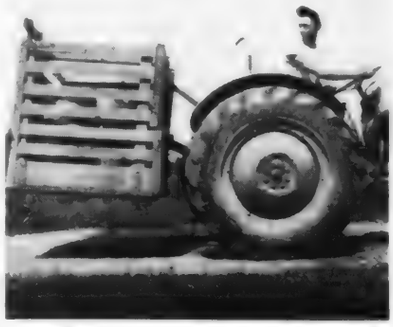
but not likely to convince a farmer that he should pay $195 for a Conner Prairie boar even though it is guaranteed to be a good breeder, when he can get a good one for half that price right down the road. How *do* they convince a farmer that he should buy a boar that will cost him $195? "We don't talk about what it will cost him," Bubenzer said. "We talk about how much money the boar will make him. Here in



It's a cinch to move a boar to the breeding paddock with a crate on a three-point-hitch.

Indiana the average feed conversion rate is 476 pounds of feed for each 100 pounds of pork produced. Suppose we say that your pigs are a little better than average and do it on 450 pounds. Our breeding stock has averaged 320 pounds over the past three years; a difference of 120 pounds of feed for each 100 pounds gain. Let's say that our boar will only pass on half of this ability or even less—say a saving of 50 pounds of feed for each 100 pounds gain. You breed him to 15 sows twice a year: that should give you a conservative 200 pigs. You raise the pigs to 200 pounds which is a saving of 100 pounds of feed per pig. Two hundred pigs times 100 pounds of feed gives you a saving of 20,000 pounds or 10 tons. At $80 a ton that is a saving of $800. Now where can you make that much money in a year on a $195 investment and still have your boar left?

"But that is just your first boar. His offspring will be 50 per cent tested stock because of his blood. Your next boar crossed to the best gilts you raised from the first will give you another out-cross and pigs with 75 per cent tested blood; your third boar will give you 87½ per cent tested blood and so on until your sixth boar would give you pigs with 98 7/16 per cent tested blood. In other words, without doing a lick of testing yourself, you wind up with a herd that is almost 100 per cent blood that has been tested for large litters, vigor, feed conversion, carcass quality, fast growth, good meat type conformation, and no heritable weaknesses. And that is what we feel most farmers want today."

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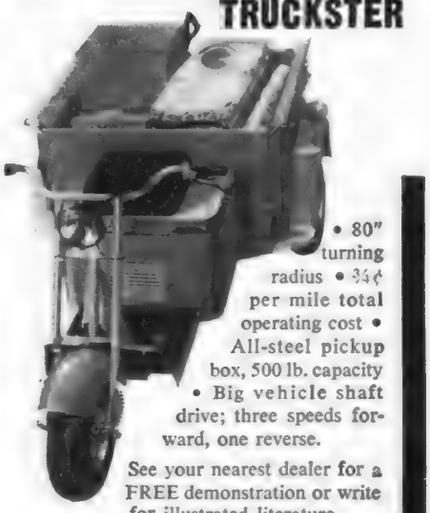

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THE DAIRY BARN

(*Continued from page* 14)

Feed, carried on the shaky barges, is distributed to the animals during the four-mile journeys on the lake. Bells of various sizes help the dairy maid, who looks after the herd during the summer, to locate the animals.

In recent years, launches and cruisers carrying noisy sightseers have become an increased hazard. The churning vessels, despite warnings from the handlers, pass close to the barges to enable photographers to take pictures. Presently there are one launch and two cabin cruisers operating on the lake.

Most of the herds are composed of brown and white Zimmenthals, a hardy breed peculiar to the Austrian and Bavarian Alps. Although not as well-known as the Brown Swiss, the Zimmenthal ranks among the world's leading dairy breeds.

Better Late Than Never While it is still best to have cows bred while they are in heat, preferably toward the end of the heat period, there is enough of a chance of settling them shortly afterwards that it might be worth a try, especially in cases where the heat period was not noticed in time. This is the latest advice from dairy workers at the University of Wisconsin.

Looking over recent records they have found that 26 per cent of a large group of cows bred after the heat period, rather than during the period, settled to the first service. Basis of their observation was 211 cows which had been inseminated during the course of a year one or two days past the heat period. The 60 and 90-day non-return rates of these cows were carefully noted. The 26 per cent non-return rate for these late bred cows compares to about a 66 per cent non-return rate for all cows bred that year during their normal heat period.

It would seem to be a good practice to let the technician go ahead and breed your cow even if she hasn't been noticed as being in heat on time, or if he arrives too late. The chances are about one in four that she will settle.

OVER THE BACK FENCE

(*Continued from page* 18)

"compete" with the British bicycles, the article explained.

Understand, I'm not in the market for a bicycle, American-built or foreign-built, with or without a coaster brake or reversible handlebars, but what I don't understand is why don't these American bicycle makers get on the ball, get more efficient, and pull themselves up to the point where they can compete with the world bicycle market? Just because they don't bring their equipment up to modern standards,

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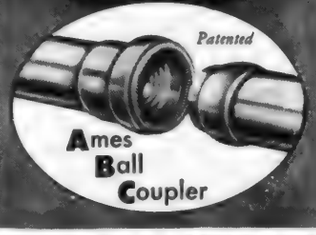

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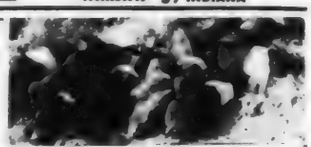

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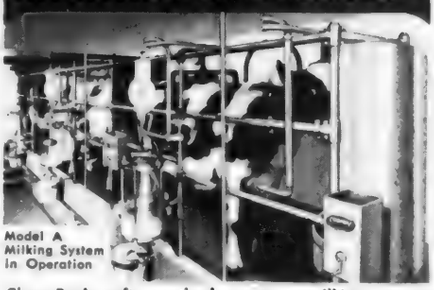

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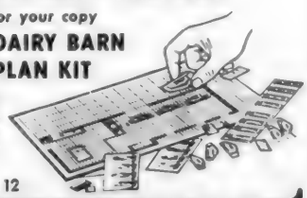

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conserve their soil, or rather their ball bearings, use more hybrid varieties, learn how to use fertilizer, increase their production per acre, get a tighter grip on expenses, stop running their rows and their bicycles down hill, etc., is no reason why us farmers should finance their bicycle business. If there are too many bicycles, let 'em cut down on production.

On the other hand, it may be that the bicycle maker, like a cotton grower, has found that regardless of how efficient you are, you still can't grow cotton profitably at 10 cents a pound or corn at $1 a bushel or bicycles at $25 apiece and still pay high wages while you're doing it.

Therefore, the bicycle makers, like the farmers, have one of two choices: (1) go out of business, or (2) get a price support.

Now I don't customarily get into an argument over these grave economic problems in this place, as there are enough economists who don't know what they're talking about without an amateur like me joining in, but occasionally I do get tired of having us farmers held up as horrible examples of government support. They ain't fooling me. I can't think of a thing this country makes, from pocket watches to bicycles to sewing machines to bank deposits, with the exception maybe of political speeches, which doesn't have a government support under it, whether you call it a tariff or a subsidy or a guarantee or parity.

Speaking of parity, you know what parity is, don't you? Parity is a fair price you ought to be satisfied with two-thirds of.

EDITOR'S NOTE: The above comment by H. B. Fox, of Taylor, Texas, is reprinted by courtesy of SOIL and WATER, the monthly magazine of conservation, Temple, Texas. Mr. Fox writes a monthly column, "The Circleville Philosopher," for *Soil and Water*. This is one of those salty columns.

POULTRY YARD

(*Continued from page* 16)

of new-born chicks is improved. Just why antibiotics stimulate growth is not yet known. One group of scientists at this meeting suggested that the antibiotics inhibit the growth of intestinal bacteria which harm the birds. On the other hand, Dr. T. D. Luckey, of the University of Missouri, pointed out that antibiotics stimulate the growth of chickens and turkeys born and raised under germ-free conditions.

A Water System Pays For Itself Three hundred hens will lay 5,100 more eggs every year if they are watered with an automatic watering system than they would lay if watered by hand. These are the findings of W. R. Whitfield, Extension Poultryman at Iowa State College. At 30 cents a dozen this would mean $127 more profit each year from the flock which would pay off the cost of installing an automatic watering system in short order.

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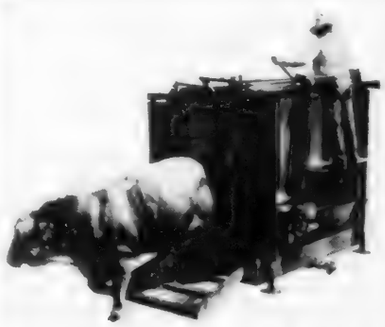

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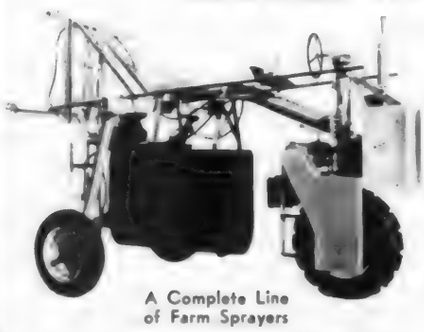

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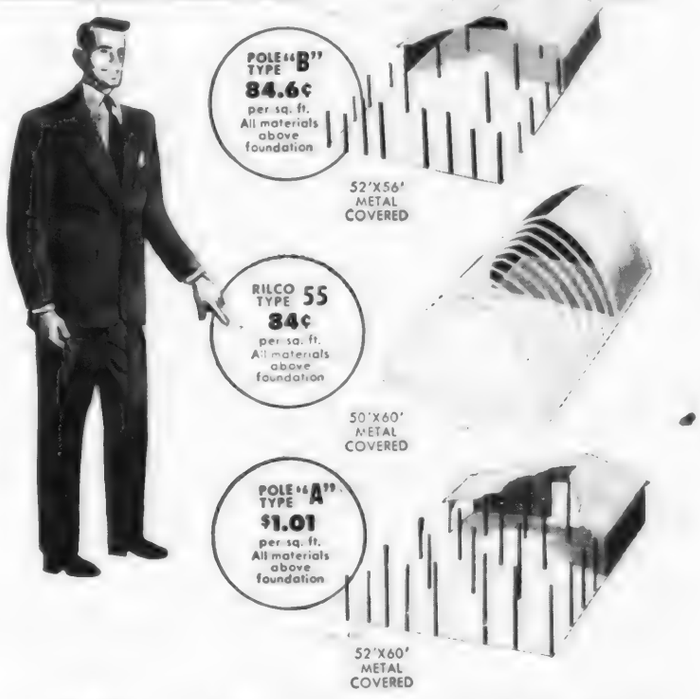

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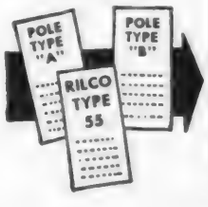

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FARM BOOKS

(*Continued from page* 20)

job of putting the farmer on an even footing with the irrigation equipment salesman.

Sprinkler Irrigation, which runs 466 pages, is not the easiest reading in the world, but it is not beyond the layman who is willing to work at it. Though the writing is somewhat formal and stiff, one gets the refreshing feeling that the compilers are working with the reader rather than trying to give a demonstration of their own erudition or mathematical dexterity. Scores of drawings, photographs, and charts are used to make the text more understandable.

The compilers of this book drew upon every available source for their information and then issued a mimeographed edition of the book which went the rounds of the experts for correction and comment before the final volume was printed. They have done a splendid job of bringing together the best current thought on soil-water relations, moisture requirements of crops, sprinkler system layouts, pumping plants, fixed and operating costs for irrigation systems, operation and maintenance of sprinkler systems, and many of the other problems which face a farmer who is considering or using this type of irrigation.

***Successful Trapping Methods,** by Walter Chansler, D. Van Nostrand Company, New York, $3.95.*

This book, the author claims, was written for the beginner, the occasional trapper, and the professional who makes much of his living from following the trap line. We feel that he is most successful in writing for the beginner; much of the detailed step by step procedures will be wasted on those with practical knowledge.

For the beginner, however, this book should prove of real value. Its chapters on the general problems of trapping, such as the selection of trapping grounds, equipment, methods, care and marketing of skins, trapping laws, and trapping tricks, as well as its specific coverage of the particular problems in trapping weasel, muskrat, skunk, raccoon, fox, opossum, beaver, otter, coyote, wolf, and others should give the new trapper the information he needs to go out and get himself some practical know-how. The author's illustrations are helpful; his drawings of the distinctively individual animal tracks are particularly interesting.

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4. **Feeds and Feeding (21st ed.)**—by F. B. Morrison $7.00
   The authoritative book on livestock and poultry feeding.
5. **The Livestock Book**—by W. R. Thompson et al $3.50
   This is the sequel to the best selling *Pasture Book.* It's a good one.
6. **Sheep Science**—by W. G. Kammlade $6.00
   The breeds, care, and feeding of sheep for wool and mutton.
7. **Dairy Science (2nd ed.)**—by W. E. Petersen $6.00
   A new edition of one of the best books on dairying.
8. **The Meat Hog**—by Claude H. Hinman $4.75
   How and why a farmer should breed toward this ideal.

Soil & Crops

9. **Commercial Fertilizers**—by G. H. Collings $8.00
   The source of fertilizers and their purchase and use.
10. **Soils and Fertilizers**—by Firman E. Bear $6.00
    An understandable book on the complex subject of fertility.
11. **Irrigated Soils**—by Thorne and Peterson $6.50
    The practice of irrigation and the management of irrigated soils.
12. **Colorstrip Plant Testkit** $4.00
    Tells whether your crops are getting enough nitrogen, potassium and phosphorus. Complete instructions come with the kit.
13. **The Pasture Book**—by W. R. Thompson $3.50
    Revised edition of this information-packed book.
14. **Grasses and Grassland Farming**—by Hi W. Staten $5.00
    One of the best books on grass farming wherever you farm.
15. **Developing Farm Woodlands**—by J. F. Preston $4.50
    A well-managed tree crop pays off with compound interest.
16. **Pasture Production and Management**—by R. H. Lush $3.75
    How the livestock farmer can get the most out of this cheapest feed.

Farm Management

17. **A Practical Guide for the Beginning Farmer**— by Herbert Jacobs $3.00
    A book to give you an intelligent start in farming.
18. **The Farmer's Handbook**—by John M. White $4.95
    Easy reference book on crops, livestock, and farm problems.
19. **Getting Started in Farming**—by Johnson and Peterson $5.25
    An excellent primer in farm management.
20. **Successful Trapping Methods**—by Walter Chansler $3.95
    How to rid yourself of varmints and make money on their pelts.
21. **From My Experience** $4.00
    Louis Bromfield's latest book about Malabar farm.
22. **Animals and Other People**— by Louis Bromfield $3.75
    Stories of the animal folk who populate Malabar.

23. **Binders for The Farm Quarterly,** ea. $3.00
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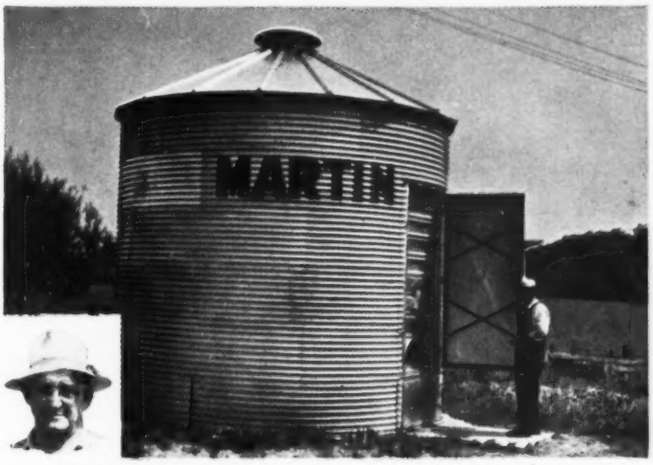
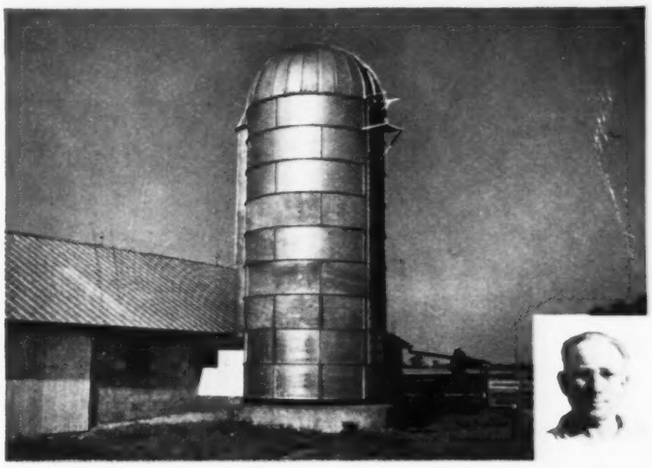
HERE'S WHAT MODERN FARMERS

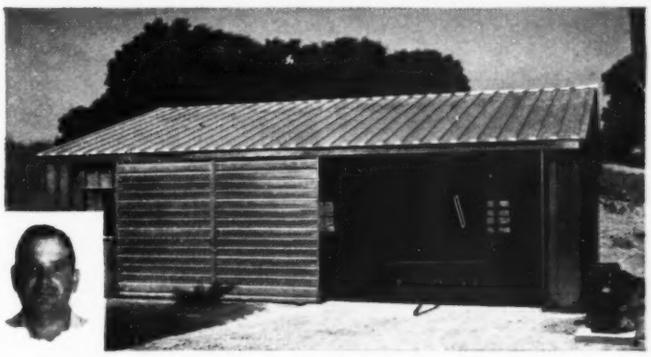


HOLMES Co., OHIO — *"I wouldn't buy another bin without a perforated steel floor and drying fan," says Ralph Weimer, Rt. 1, Lakeville, Ohio. "I can use my new Martin Harvest Hoarder Bin equipped with a drying fan for storing any small grain, soybeans, and either ear or shelled corn. That fan puts plenty of air through the grain and you can even smell the moisture in the air coming out of the top of the bin. It's verminproof, makes aerating or fumigating easy — and you never have to handle grain until you're ready to use or sell it. Grain stays clean and is easier to get out of the bin, too. I recommend a Martin to anyone who needs grain storage, regardless of what crops he raises, or the size of his farm."*

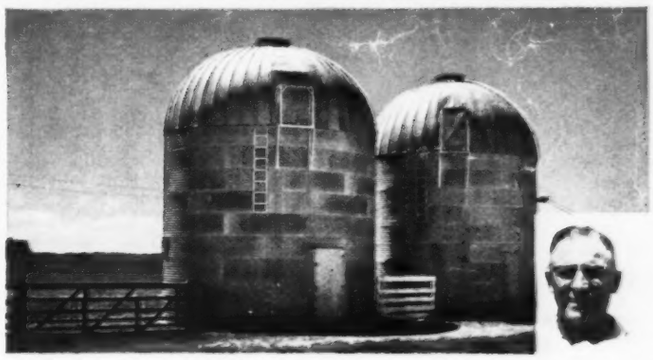


MADISON Co., ILLINOIS — *"I've made silage for years, but last fall I filled my new Martin Steel Silo with corn that was ruined by drouth, was badly fired and heavy with smut. It was all I had to ensile, and I didn't think it would make. There was no spoilage — not even around the doors — and it made excellent silage that my cows liked." That's the comment of Christ Schwarz, Rt. 1, Highland, Illinois, on his new Martin silo. He also likes his Martin silo because the airtight sidewalls provide for better conditioning for his silage, and help to prevent overheating by letting out excess heat. It's easier to clean down inside in winter, too, because silage doesn't stick, and thaws free on sunny winter days.*

ARE SAYING ABOUT MARTIN



CLARK Co., OHIO — *"Nowhere else could I get as much building for what this Martin cost," says Herman L. Canter, Rt. 4, Urbana, Ohio, of his 36 x 40 machinery shed and farm shop. "Martin Rigid Frame Buildings give you straight sidewalls, and a clear-span, post-free interior in a handsome building that's strong, permanent, weather-tight and fireproof," says Mr. Canter, who erected this building himself, following complete, step-by-step instructions. "Now my two tractors and all my machinery are ready to go anytime, and I have a comfortable, convenient workshop," he says. Martin buildings feature a wide choice of doors, windows, ventilators and other accessories that make them adaptable to every farm building need.*



GIBSON Co., INDIANA — *"I get more corn from an acre because I lose far less from dropped ears and shelling in the field by picking early and drying in a Martin High Round Crib," says Virgil Kendle, Rt. 1, Ft. Branch, Indiana. "A High Round gives more permanent, rat-proof, first class storage at a lower cost per bushel than any other crib. By picking early I can cultivate earlier, and sow wheat earlier — and I estimate I get 5 bushels more wheat per acre, too. No farmer growing corn, or on a corn-wheat rotation, can afford to be without a High Round," says Mr. Kendle. "My Harvest Hoarder Bin is a perfect companion to my High Rounds, too," he adds.*

STEEL-BILT FARM BUILDINGS

The experiences of these four modern farmers are typical of thousands of owners of Martin Steel-Bilt farm buildings. They know that dollar-for-dollar invested, Martin buildings work harder and contribute more to the efficiency of their operations. Martin buildings are designed to let you take advantage of modern farming methods and technology. Martin pioneered in the use of all-steel structures for farm use, and builds a complete line of farm buildings. For more information on any Martin building, or crop conditioning, mail the coupon or consult your local Martin dealer. We invite your questions on any farm storage problem.

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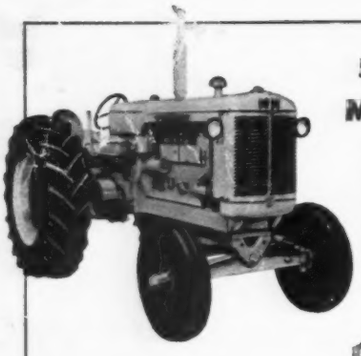
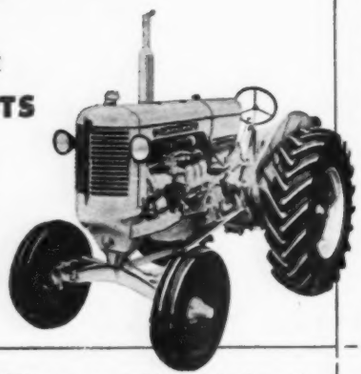


5-PLOW POWER

MODEL GB

This mighty Model GB offers 5-plow diesel power with the handling ease of far smaller tractors. Now with full-crown fenders and enclosed platform.



4-PLOW POWER

MODEL UTS

All the work-tested advantages of the famed MM Model U with the new fuel efficiency of a completely modern diesel engine. Full 4-plow power.

4-PLOW MODEL UB—UTS power in a Visionlined universal-type tractor. 3 front end styles: single wheel, dual wheel, or extended adjustable—all interchangeable.

4-PLOW MODEL UB SPECIAL—all the advantages of the UB plus new, advanced power steering (extra equipment) and a 3-way front end that converts to single wheel, dual wheel or extended adjustable right on the farm.

4-PLOW MODEL UTS SPECIAL—The UTS standard tread tractor equipped with MM's new power steering system (extra equipment).

YOU GET NEW DIESEL POWER

Now, Minneapolis-Moline offers *five* diesel tractors in the 4-and 5-plow size to give you money-making MM diesel performance, *plus* the special features *your* farming calls for. Two models bring you new hydraulic power steering, two offer a choice of three front-end types, all *five* give you unbeatable diesel efficiency.

YOU GET NEW DIESEL ECONOMY

Fuel and maintenance costs drop to a new low with these rugged, efficient MM Diesels. MM turbo-cell combustion gets more work from less fuel, cuts engine wear. And look at these low-maintenance advantages: cylinder heads and blocks cast in separate pairs for easy accessibility; low-cost, single-package oil pump; single plunger fuel injection pump; tin-plated, aluminum alloy pistons; gear-type oil pump; over-sized oil filters; larger bearing areas for added strength. When you own an MM Diesel tractor, these MM features protect your investment every profit-raising day.

YOU GET NEW DIESEL SIMPLICITY

Easy, handy operation is built right into these MM Diesel tractors. Powerful, 12-volt starters and quick-acting manifold heaters mean sure, all-weather starts. Driving is simpler and safer with easy steering, larger clutch, over-sized brakes. Investigate these MM Diesels. Discover why they give you more for your money . . . pay performance profits longer. Mail the coupon for complete information. Then see your MM Dealer for on-the-job proof!

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